THE LEARNING AND RETENTION OF PLEASANT AND UNPLEASANT ACTIVITIES

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CONTENTS

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SECTION 1.

INTRODUCTION

The present subject has sometimes been called the "Relation Between Feeling and Memory," and it includes two problems which have not always been clearly distinguished from each other. In the first place, what is the relative efficiency of memory for pleasant, as compared with unpleasant, feelings and emotions? Here the conscious and unconscious activities are the feelings and emotions themselves. This question of "affective memory" will be considered in some detail at the end of the last section.

A large number of psychological activities are not feelings or emotions, but they may still be pleasant or unpleasant; and the second problem is concerned with the relative efficiency of memory for pleasant activities as compared with memory for unpleasant activities; or, stated in more objective terms, what is the relative efficiency of learning and retaining pleasant activities as compared with unpleasant? We shall be principally concerned with this second problem in the present paper. It is closely related to all of the problems of learning, retention, and reproduction; and the role of the emotional factor is the object of as special an interest now as it was when it was first propounded several centuries ago.

Although psychological problems were only of secondary interest to the earlier philosophical writers, the following brief reference to some of their speculations will show how far back into the past the roots of our subject extend. Certain of these early philosophical views have had a marked influence on the trend of modern discussions.

Plato's views on feelings were largely a reflection of the opinions of his predecessors, and his theory of pleasure and pain, which was originally suggested by Anaxagoras, was the first important contribution to affective psychology (**87, 86**). Plato believed that bodily pleasures or the pleasures of sense

* In carrying out the experiments the writer has been assisted by his wife, Eloise Boeker Cason.

are generally conditioned by antecedent pain. Pleasure is nothing very positive or real; it is merely the filling up of a want in existence, or an incident in the satisfaction of a pre-existent desire. "Most of the so-called pleasures which reach the mind through the body, and the keenest of them, belong to this species, . . . they are a kind of release from pain."[1] This theory includes a Cynic element, but Plato would not accept the extreme Cynic view that pleasure is always merely negative, and that it is always conditioned by antecedent pain. He recognized that his theory could not be universally maintained even in the case of bodily pleasures.[2] "Turn your eyes to pleasures which do not grow out of pains. . . . Among many others take as the best example for your consideration the pleasures of smell; which, without the existence of any previous uneasiness, spring up suddenly in extraordinary intensity, and when they are over, leave no pain behind.[3] Plato also cited the positive pleasures of color, form, sound, and the pleasures of knowledge; which he said were pure pleasures, unmixed with pain, and not merely relative.[4]

Plato claimed that whatever is contrary to nature is painful, and that whatever is in harmony with it is pleasant. When the organic harmony is perfect and undisturbed, there is neither pleasure nor pain.[5] The pleasures of remembering and of anticipating pleasure are a kind of affection which originates in ideational processes.[6] These pleasures of the soul harmonize with his theory of bodily pleasures in so far as the pleasure is derived from the satisfaction of a desire. "Memory attracts us towards the objects of desire."[7] "Desire . . . implies want and its satisfaction, replenishment, and the one is admittedly painful, the other pleasant. If a person, while actually suffering, calls to mind past pleasures which, if present,

[1] *Republic*, 86, Book IX.
[2] Cf. Bernard Bosanquet, *A companion to Plato's Republic*, 1906, 353-359.
[3] *Republic*, 86, Book IX.
[4] *Philebus*, 87, 51. Plato's theory of the negative character of pleasure has influenced many later writers. Kant held that the ordinary state of our vital powers is a neutral condition of comfort *(Wohlbefinden)*, out of which we are frequently urged by pain. Every pleasure must be preceded by pain, pain always intervenes between any two pleasures, and pain is necessary for life. (*Anthropologie in pragmatischer Hinsicht*, Sect. 60.) A similar doctrine was expounded by Schopenhauer, and this view is a fundamental feature in his system of pessimism.
[5] Cf. Gardiner, 42, 479.
[6] *Philebus*, 87, 32-42.
[7] *Philebus*, 87, 34.

would afford relief, his state may be described either as one of mixed pleasure and pain, or of a double pain, according as he has the sure hope of satisfied relief or is in despair."[8]

Aristotle came nearer to discriminating between the psychological and logical points of view than any other ancient philosopher, and his theory of feelings was fundamentally biological and dynamic. Pleasure is an activity that accompanies any unimpeded vital process; it is something superadded and attached when the normal functions of life are being fulfilled.[9] "Pleasure completes the activity . . . as a kind of supervenient finality, like the bloom that is set on youth."[10] Aristotle argued in favor of the positive character of pleasure, and considered that pleasures and pains are the opposites of each other. After describing the things that are pleasant, he said, "This account, then, of pleasant things may suffice; the painful things are manifest in the opposites of these."[11] Pleasure also accompanies the active exercise of the mental faculties: "The exercise of every sense is attended with pleasure, and so is the exercise of reason and the speculative faculty."[12]

In some of his writings Aristotle insisted on the relation of all pleasure to bodily sensation. In the *Rhetoric,*[13] he said, "For pleasure . . . is either in present action, in which case it is a direct sensible experience excited by a sensibly perceived object, or in memory or anticipation, which are dependent upon such experience. The objects of memory are pleasant not only if they were pleasant at the time, but also if they were pleasant in their consequences. Objects of anticipation are pleasant if pleasant consequences are expected from them."[14] In R. C. Jebb's translation, the last passage and the sentences which follow read: "Now remembered things are pleasant, not only in those cases in which they were pleasant at the time, but sometimes, though they were unpleasant; provided that their sequel be noble and good: whence the saying 'Sweet it is from safety to look back on toil,' and 'A man takes joy afterwards even in griefs, when he looks back upon much suffered and done.' . . . Generally, all things which, when

[8] Gardiner, 42, 481.
[9] See E. M. Cope, *An introduction to Aristotle's Rhetoric, with analysis, notes, and appendices,* 1867, 234-239.
[10] Gardiner, 43, 6.
[11] *Rhetoric,* 7, Book I., Chap. 11.
[12] Gardiner, 43, 6.
[13] Book I., Chap. II.
[14] Gardiner, 43, 11.

present, give joy, also supply, as a rule, pleasures of memory or hope."[15]

The Cyrenaic school of philosophy claimed that past and future pleasures have no real existence for us, and they denied that pleasure can be caused by past or anticipated good fortune. They admitted that there is some factor besides immediate sensation in these representations, because otherwise it would be difficult to account for the fact that a person may derive pleasure from the representation of grief, but not experience any pleasure when he sees it in real life.[16] The Cyrenaics claimed that bodily pains are worse and bodily pleasures are greater and more powerful than the mental pains and pleasures.

The Cyrenaics were opposed by the Epicureans who believed that the most powerful sensations are mental. The Epicureans held that while bodily sensations are confined to the moment, mental sensations are connected with the past and future, and the pleasures of the moment may be increased through memory and hope. Mental pleasures and pains have a wider range and a greater independence than the bodily pleasures and pains.[17]

John Locke discussed the learning and retention of aversions and antipathies, and was more interested in the common everyday feelings of people than some of the other writers on association. Locke held that the recall of past experiences is to some extent an active process. "In viewing again the ideas that are lodged in the memory, the mind is often-times more than barely passive; the appearance of those dormant pictures depending sometimes on the will. The mind very often sets itself on work in search of some hidden idea, and turns as it were the eye of the soul upon it; though sometimes too they start up in our minds of their own accord, and offer themselves to the understanding; and very often are roused and tumbled out of their dark cells into open daylight by turbulent and tempestuous passions; our affections bringing ideas to our memory, which had otherwise lain quiet and unregarded."[18]

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[15] 7, 47. A further discussion of Aristotle's theory of memory and recollection may be found in Bergemann, Gedächtnis; theoretische Untersuchungen und mnemotechnische Spielereien im Altertum, *Arch. f. Gesch. d. Phil.*, 1894-95, 8, 336-352.

[16] Gardiner, 42, 476.

[17] Cf. Gardiner, 44, 208. Also Brochard, 14.

[18] 64, Book 2, Chap. 10. Sect. 7.

Lotze made important contributions on the physiology of the emotions,[19] but he was primarily interested in the needs, hopes, and wishes of people. He claimed that association is determined by a struggle between the emotional values of concepts, and that the force of ideas depends upon their concatenation with emotions (**65**, 465). In his writings, association "is not interpreted as a struggle of their own reproductive tendencies among themselves, that is, they act directly on each other and not through the mediation of ideas. Feeling indeed is not aroused, nor does it acquire its significance through association, which is rather determined by it."[20] Lotze said, "The images of memory resemble shadows, which do not differ in weight like the bodies that cast them."[21]

Horwicz believed that feeling plays a dominating role in mental life, and that it is the most elementary and general psychic activity, and the point of departure of other mental processes (**51**). The movements which are produced in the organism by pleasure and pain clear the way for cognition. All feelings are impulses to movement, and the feelings are the basis of memory.[22] The experience which is most highly colored with emotion always gains our attention.[23] Although the *Gefühl* was thought to be the vehicle of the train of thought, Horwicz claimed that it is difficult, if not impossible, to remember the feelings themselves. The feeling in itself is not the elementary factor in memory, but rather the feeling in its necessary relation with movement. Feeling is therefore the indirect basis of association.[24]

In his two papers on the *Gefühlsempfindungen* published in 1907 (**107**) and 1916 (**108**), Stumpf argued in favor of regarding as sensations what are sometimes referred to as sense-feelings, and these sense-feelings included the feeling-tones. According to Stumpf, a pain sensation has only a single quality, and that is that it is painful. It is an unpleasant sensation in itself. The second chief quality in the sense of feeling is agreeableness, and a pleasure sensation is likewise characterized by a single quality, the quality of pleasure. Stumpf objected to the common distinction between the sensa-

[19] Cf. Fauth, 36, 57-67.
[20] G. Stanley Hall, *Founders of modern psychology*, 1912, 93-94.
[21] **65**, 461. See also **65**, 532-533.
[22] See Fauth, **36**, 69-83.
[23] **54**, Vol. 1, 276f.
[24] **54**, Vol. 1.

tion itself and the feeling-tone of the sensation. According to the older attribute theory the feeling element must be assumed. This assumption, however, is not necessary, because some sensations are "untoned," and the feeling-tone itself does not always depend upon the sense-quality. Some of the bodily pleasures and pains can be ideally revived; and some subjects may not be able to reproduce smells, for example, although they can easily reproduce their feelings of pleasantness and unpleasantness. Stumpf rejected the older view that feeling is a function of sensation, and maintained that all sensations of feeling (*Gefühlsempfindungen*) are sensory feelings, and that all sensory feelings constitute a particular class of sensations of sense (*Sinnesempfindungen*). But he differentiated sharply between sensations of feeling, on the one hand, and the emotions and esthetic feelings, on the other; holding that emotions and esthetic feelings cannot be broken up or disintegrated into sensations of sense. Stumpf's theory has had considerable influence in breaking down the rigid distinction between sensations and feelings.

The speculations of Plato, Aristotle, the Cyrenaics, and the Epicureans constitute the principal historical background of the present subject. Plato's theory of pleasure, Aristotle's description of the emotions, and the Stoics' classification of passions have been the source of much later writing in this field.[25] The importance of the arguments advanced by Locke, Lotze, Horwicz, and Stumpf will become more apparent in the following sections as we pursue this subject from a more scientific point of view.

[25] Cf. Lafontaine, 61, and Siebeck, 101.

SECTION 2.

EXPERIMENTS WITH RESTRICTED LABORATORY MATERIAL AND ACTIVITIES

The modern approach to the learning and retention of pleasant and unpleasant activities differs from the earlier speculations largely in the use of the experimental method, but the affective processes still remain somewhat resistant to the experimental attack. In the summary of the previous experimental work in Sections 2 and 3, we have divided the studies into two groups, first, those in which restricted laboratory material and activities were used, and, second, those which were concerned with more lifelike situations and activities. The former group is described in the present section, and the latter group in the section which follows. The conclusions reached by the authors of the experiments included in the present section have generally been valid for the limited activities they were investigating, but some of these writers have not been justified in extending their conclusions to include the more general situations and experiences of everyday life. On the pages which follow we shall briefly describe the procedure used and the results obtained in the various experiments, which are taken up in a chronological order. In practically all cases the author's interpretation of his results is omitted.

Gordon (**45**) reported two experiments in 1905 which were performed under Külpe at Würzburg on the problem of whether the agreeableness or disagreeableness of certain visual experiences had an influence on the accuracy of memory for these experiences. In the first experiment each of 30 colored figures was shown the subject for 3 sec. After each exposure the *S* judged the figures as P, U, or I,[1] and attempted to give a verbal description of what he had just seen in the figure, and Gordon estimated the number of points which the *S* had correctly remembered. The experiment was repeated 3 weeks later. Seven experienced *S*'s were used, and the incomplete results showed no reliable differences in the immediate memory for the P, U, and I impressions. The same procedure was

[1] The following abbreviations are used in the present paper: "P" for pleasant, "U" for unpleasant, "I" for indifferent. "*S*" for subject, and "*E*" for experimenter.

then followed with 50 black and white figures, and the results were again negative. Difficulties in estimating the number of details in the figures remembered and considerable uncertainty in interpreting the results led to a second experiment in which 40 figures were successively projected on a uniformly illuminated screen for 1 sec. On each figure were placed 9 squares in a regular arrangement, and a different placement of colors was used on some of the squares of each figure. Three or four of the following colors were used on each figure: pink, red, orange, yellow, green, blue, and violet. After each exposure the *S* judged whether the combination had been P, U, or I, and attempted to name the colors seen and to state on which squares they had been placed. One week later the figures were exposed again, and the feelings were judged and the memory for the details tested as before. Four *S*'s completed this experiment; and again no reliable differences were found in the memory for the P, U, and I impressions. In both experiments, there was also no difference in the number of P and U figures which could be recognized when seen the second time. One difference, however, seemed to be found between the recall of the P and U figures: there was apparently an "optimism of memory," or a tendency to remember the figures as more P than they really were when seen the first time. One of the complicating factors in interpreting the results was the fact that the feelings were judged after looking at the figure as a whole, whereas the memory was generally measured by the number of details in the figure which could be verbally described immediately after seeing the figure. It may be doubted whether the feelings aroused in this experiment were strong. In a short article (**60**), Külpe discussed and criticized Gordon's experiments, which had been performed in his laboratory.

Birnbaum (**13**) reported an experiment in 1912 in which he measured the association-times of 5 hospital attendants to P, U, and I words. For each of the *S*'s, the median times for the 3 groups of words were approximately the same.

In 1913 Tait (**110**) described 2 minor experiments carried out at Harvard University. In the first experiment, several lists, of 20 disconnected words each, were read to 11 *S*'s, who were immediately asked to reproduce them. The 3 different kinds of lists included words that were assumed to be P, U, and I. The *S*'s were asked not to try to remember the words

but just to "let them drop in and see how many remained." A combination of reproduction and recognition seems to have been used, and the experiment appears to have extended over a period of 3 weeks. On the average, the P words were remembered better than the U, and both the P and the U were remembered better than the I. In the second experiment, 15 colors were shown the *S*, and he judged each color according to a 7-point scale from very P to very U. Two or 3 alterations were then made in the series of colors, and judgments of the colors arranged in a different order were again recorded. After each color had been exposed the *S* was asked whether it had been included in the preceding series. A total of 242 tests was made, but the number of *S*'s is not given. The average number of colors recognized was, for P colors 63%, for U colors 47%, and for I colors 27%.

In 1918 Tolman and Johnson (**115**) measured the free association reaction times of 18 men and 17 women at Northwestern University to three lists of words which were thought to be P, U, and I. The median association-times were longer for the U words than for the I words in the case of both sexes, but especially in the case of the women. With the women *S*'s also there was some slight evidence that the median association-times were longer for I words than for P words. The U words that were related to simple sense qualities tended to lengthen association-times as much as the U words of deeper emotional significance; and the conclusion was reached that "simple unpleasantness as such lengthens association-time."

In 1921 Smith (**102**) reported a behavioristic experiment carried out at Cambridge University in which an attempt seems to have been made to measure the affective tone of 100 stimulus words mainly by means of the psychogalvanic method. It was thought that some of the stimulus words were memorized by the *S*'s, and some attempt was made on later occasions to measure the retention of these words. No information was available as to what kind of feelings, if any, was present during the psychogalvanic deflections, and it was impossible to know how many times P or U feelings were present without a deflection. None of the important factors in this experiment was adequately measured or controlled.

Berliner (**12**) reported an experiment in 1921 on 7 groups of about 20 *S*'s each; and most of the *S*'s were students at Columbia University. In the case of each group, each *S*

ranked a number of pictures according to beauty; and after an interval of 1, 2, or 3 weeks he was unexpectedly shown the same pictures mixed with a number of other pictures, and a measure was obtained of his recognition memory. The following correlations were obtained between esthetic ranks and errors of recognition: —.73, —.72, —.61, —.38, —.37, —.18, and +.26; showing that retention was better on the whole for the more beautiful pictures.

A. R. Stone (**106**) reported an experiment in 1925 on 12 McGill University sophomores, in which each *S* was first required to "write down a list of 24 names, 12 being of people he liked and the other 12 of people he disliked." About a month later the *S* was shown a series of unfamiliar photographs, and a measure was obtained of his ability to form associations between the photographs and the names he had previously written down. The *S* attempted to recall the name which had been allotted to each, as the pictures were exposed one at a time. The results suggested that the associations between the pictures and the names which were liked were retained better than the associations between the pictures and the names which were disliked.

In 1925 Gordon (**46**) reported an experiment with 11 men and 189 women *S*'s, all but 3 being students in psychology at the University of California, Southern Branch. The name of an odor was pronounced at the moment the odor was perceived, and the following 10 odors were used: lemon, cinnamon, peppermint, bergamot, lavender, eucalyptus, tansy, creosote, valerian, and asafoetida. The *S* was given each of the 10 names once in connection with its proper odor, and once also in connection with one of 10 non-odorous bottles, the non-odorous bottles being mixed among the odorous bottles in an irregular order. After each of 2 series of 10 bottles each had been smelled, the *E* said: "Give all the names you can and point to the bottles where they belong." The *S* then arranged the 10 odorous bottles in order of rank for agreeableness and disagreeableness. They frequently commented on their lack of familiarity with some of the names, such as bergamot, creosote, tansy, valerian, and asafoetida. Bergamot was generally found to be P, and the other four U. The effect of this factor of unfamiliarity was to make it more difficult to recall the U odor names. It was found, however, that the names of the odors which the group as a whole judged P were recalled

no better and no worse than the names of the odors which the group as a whole judged U. The experiment was not concerned with the recollection of P and U odors, but with the recall of the names of the odors and the correct serial positions of the odors when P, U, and I odors were used as stimuli.

Anderson and Bolton (**5**) reported 2 experiments in 1925 on the influence of pleasantness and unpleasantness on the reading times of words, the recall of words, and the recall and recognition of odors. Eighty *S*'s were used, most of them students in elementary psychology at the University of Michigan. In the first experiment, associations were formed between 1- or 2-syllable nonsense names and P and U odors. The *S* smelled each bottle which contained the odorous substance, wrote down its nonsense name, and whether it was P, U, or I. He was then required to turn the sheet of paper over and to write as many of the nonsense names as possible. "He was next given the same 10 odors with an equal number of new ones, and was requested to smell each of the 20 and pick out the 10 in the original series." The per cent of names that was recalled, and had been connected with the 3 different kinds of odors, was for P odors 30, for U odors 29, and for I odors 27. The per cent of odors recognized was, for P odors 71, for U odors 73, and for I odors 62. In the second experiment, reading times were measured for 50 P and 50 U words. Each word was presented in an exposure apparatus, and the time which elapsed until the *S* began to speak the word was measured by a chronoscope. When this part of the procedure had been completed, the *S* was unexpectedly asked to write as many of the words as possible. The average reading time in sigma was, for P words 347, and for U words 351. The average number of words recalled was, for P words 7.0, and for U words 5.1.

In 1926 Würdemann (**127**) reported the results of a highly introspective study carried out at the University of Leipzig with 20 trained *S*'s on the "quality, intensity, and depth" of feelings that were present when associations were formed between the odors, tactual impressions, and visual impressions of various objects. The stimuli were given in a number of combinations, and introspections were taken and recall was measured after various intervals of from 1 to 42 days. It was found that experiences that were marked out because of intensity or depth of feeling were remembered better than

weak or flat experiences. Würdemann did not study the relative efficiency of remembering P and U experiences.

Chaney and Lauer (**23**) reported an experiment in 1929 on the influence of affective tone on learning and retention, the *S*'s being 20 women students, mostly freshmen and sophomores at Iowa State College. Different groups of *S*'s attempted to learn and recall words that were P, U, and neutral. No reliable differences were found in the learning or retention of the 3 lists of words.

Section 3.

STUDIES OF MORE LIFELIKE SITUATIONS AND ACTIVITIES

The principal weakness of the experiments described in the preceding section is that the material and procedure used were of such a nature that the results obtained are not necessarily valid for the more general situations of everyday life. Laboratory experiments sometimes have the advantage of being more scientific, but general conclusions based on these results may be quite precarious. The weakness of an experiment in which odors are used lies in the fact that most people do not spend their lives in going around and sniffing the things which surround them. The experiments which are briefly summarized in the present section are relatively more important because they are concerned with more lifelike situations and activities, and have been carried out at a level more likely to yield general conclusions.[1] Five experiments of our own are described in Sections 4, 5, 6, 7, and 8; and in Section 9 the general conclusions which seem justified from all of the experimental and observational data are stated and discussed.

In 1899 Colegrove (**25** or **26**) reported the results obtained with a questionnaire on memory which was filled out by 1372 Whites, 182 Negroes, and 104 Indians. There were 14 questions in all, and Question 8 was, "Do you recall pleasant or unpleasant experiences better?" The large majority of the Whites said they recalled P experiences better than U. Negro females also said they remembered P experiences better, but Indian males said they recalled U experiences better.

In 1904 Kowalewski (**58**, 109-110) described the results of "a few inquiries" on 124 boys and 146 girls between 10 and 13 years of age, in which the following question was asked, "Which can you remember more clearly and distinctly, pleasures and joys (*Freuden*) or pains and sorrows (*Leiden*)?" Of the 124 boys, 86 said they remembered P experiences better, and 38 said they remembered U experiences better; and of the 146 girls, 99 said they remembered P experiences better, and 47 said they remembered U experiences better.

In 1908 Kowalewski (**59**) described an experiment on 105

[1] Some of the experimental literature on this subject has been discussed but incompletely summarized by Douglass, 31, and by Meltzer, 68.

school boys between 9 and 15 years of age. On the day after a holiday the 3 groups of boys were given 10 min. in which to write down the things that gave them pleasure on the holiday. These papers were then collected, and after an interval of 5 min. they were given 10 min. in which to record their U experiences on the same holiday. Ten days later the boys were again asked to write down their P and U experiences on the holiday in question. On the first test, 61 boys had more P memories, 21 had more U memories, and in 23 cases the two were equal; while on the second test, 42 boys had more P memories, 18 had more U memories, and in 45 cases the two were equal. A slightly larger per cent of U than P experiences which had been recorded on the first test were given again on the second test 10 days later. This difference is not necessarily an indication of the relative memory for P and U experiences which occurred during the original holiday; it is partly an indication of the ability of the *S*'s at the time of the second test to write down what they had already written down 10 days before on the first test. Offner criticized Kowalewski's results and interpretation, and he also discussed the tendency towards optimism in memory (**74**, 68-72, 184).

Henderson reported an experiment in 1911 (**50**) in which 7 college students about 20 years of age and 3 adults approaching middle life recalled incidents from their past lives. There were 6 men and 4 women among the *S*'s. They were asked to give incidents just as they arose in memory, without selecting one sort rather than another, but there was some attempt at an even distribution over the entire life period. After obtaining 100 memories from each *S*, he was required to state whether the feelings which were originally present when each incident occurred were agreeable, disagreeable, or indifferent. The following combined frequencies for the original experiences were obtained for the 1000 incidents:

Agreeable	55.1%	A.D.	6.7
Disagreeable	33.1%	A.D.	4.7
Indifferent	11.8%	A.D.	4.6

Peters described an experiment in 1911 (**79**) in which 8 *S*'s recalled a personal experience when a stimulus word was given. After each reproduction, *S* indicated the nature of his feelings during the original experience and also while it was being recalled. He was also asked how long ago the experience oc-

curred, how frequently he had had this kind of experience, and how many times it had been recalled. In 1914 a similar experiment was reported by Peters and Němeček (**80**) on two groups of *S*'s. The results were obtained by Johann Dauber, using 28 pupils 10 to 11 years of age in the Würzburg Volkschule, and by Němeček, using 118 pupils 14 to 24 years of age in the New Vienna Commercial School. A list of about 100 stimulus words was used, and the *S* recorded the first personal experience he could recall after each stimulus word was heard. The principal results obtained in 1911 and also with the two groups in 1914 are given in the adjoining table.

Results Reported by Peters and Němeček

		Ages 10-11 (*N* = 28)	*Ages* 14-24 (*N* = 118)	*Adults* (*N* = 8)
Feelings Present During Original Experience	Affective Experiences	85.0%	86.1	80.0
	Indifferent Experiences	6.3%	13.1	16.0
	Questionable	8.7%	0.8	4.0
	Pleasant	56.2	50.2	65.0
	Unpleasant	43.8	45.6	30.0
	Mixed	—	4.2	5.0
Feelings Present on Recalling Experience	Affective Experiences	61.5	72.6	50.0
	Indifferent Experiences	27.8	26.8	43.0
	Questionable	10.7	0.6	7.0
	Pleasant	53.4	56.2	61.0
	Unpleasant	46.6	38.2	34.0
	Mixed	—	5.6	5.0

These results show that for the youngest group of *S*'s, 85% of the recalled experiences were affectively toned at the time they originally occurred, 56.2% were P and 43.8% were U at the time they originally occurred. A number of experiences that were originally affectively toned were I on recall, and the shift from U to I was more common than the shift from P to I. The authors claimed that the experiences that were P or U when they originally occurred had a more personal meaning at that time than the experiences that were I when they originally occurred. There was a smaller per cent of P experi-

ences among the recent than among the more remote experiences; and there was a larger per cent of U or I experiences among the recent than among the more remote experiences. The greater personal meaning of the experience for the *S* at the time the experience occurred favored the more efficient recall of the U as compared with the P and the more efficient recall of the U and the P as compared with the I. It was thought that the more efficient memory of the P as compared with the U was due to a general tendency towards impairment of the disagreeable. The U experiences that were recalled had a very personal meaning, and they were recalled in spite of the tendency towards impairment of the disagreeable.

In 1915 Myers (**72**) described an experiment on the relative tendency to remember things best liked and things least liked, using 232 *S*'s from grammar school, high school, and normal school. The *S*'s were asked to write down lists of familiar things, such as colors, foods, musical instruments, animals, books of fiction, and famous men of all time. For each class of objects they were next required to write the name of the thing liked best and the thing liked least. From 1 to 3 minutes were generally allowed to write each list. It was assumed that when a person writes a list of names belonging to a particular class he will tend to write first the names he can most readily recall. The results showed that on the average the thing best liked was located much nearer the beginning of the list than the thing least liked. In the case of every list the percentages of cases of first-like were predominantly above the median and the percentages of cases of least-like were predominantly below the median. The results showed that in this situation the agreeable generally finds expression more readily than the disagreeable.

In 1917 Baxter, Yamada, and Washburn (**10**) reported an experiment on the recall of pleasant and unpleasant experiences: 69 Vassar students were used as *S*'s. Two series of 30 words each were employed as stimuli, the words being taken from the Kent-Rosanoff list. In the first series the *S* was required to respond as soon as the stimulus word had suggested an unpleasant personal experience which she had had in connection with the thing signified by the word. In the second series the *S* was required to respond in a similar manner when the stimulus word suggested a P personal experience. Each of the two series of words was used in recalling

P experiences with half of the *S*'s and in recalling U experiences with the other half of the *S*'s. A positive correlation was found between especially slow recall of U ideas and a cheerful temperament. For 72% of the *S*'s the average time for recalling P experiences was shorter than for recalling U experiences. Also, the number of cases where *S* failed to respond within 15 sec. was, for P experiences 90, and for U experiences 144. After recalling each experience *S* was asked to state whether it was physical or mental; and the results suggested that mental pleasantness is more readily recalled than physical pleasantness, and that physical unpleasantness is more readily recalled than mental unpleasantness.

In 1919 Morgan, Mull, and Washburn (**70**) reported an experiment on the recall of emotionally toned experiences, using 97 Vassar students as *S*'s. On each of 5 successive days, different lists of 50 stimulus words each were used. The *S* noted the first idea that came to mind and reported whether it was P or U. In each of the 5 series, a P idea was suggested about twice as frequently as a U idea, although no especial care had been taken to select stimulus words with or without P or U suggestions. "It seems to be a psychological fact that a normal person recalls pleasant experiences more readily than unpleasant ones; this law may have operated not only in the minds of the observers, making them think of more pleasant than unpleasant ideas in connection with the stimulus words, but also in the mind of the author of the method, whose intention was to choose words at random. Among the observers, out of 485 cases, five series for each of 97 persons, only nine experienced more unpleasant than pleasant suggestions." A judgment of the general degree of optimism or pessimism of *S* was obtained from her intimate associates; and a positive correlation was found between the number of P and U associations and optimistic and pessimistic temperaments respectively.

Griffitts (**47**) reported an experiment in 1920 on 36 beginning students in psychology at the University of Michigan. When a stimulus word was given, *S* recalled a previous experience, and then judged the experience as P, U, or I. In the instructions to the *S*'s no distinction was made between the feelings which were present during the original experience and the feelings which were present while the experience was being recalled. A set of 50 stimulus words was repeated three

times, with the words in different orders, and an hour later the *S*'s were unexpectedly asked to recall as many of the stimulus words as possible. More P than U past experiences were suggested by the stimulus words; and a larger per cent of words which suggested P past experiences were recalled than of words which suggested U past experiences. In most cases a larger per cent of words which suggested U past experiences was recalled than of words which suggested I past experiences.

In 1923 Washburn, Field, and Wolf (**118**) described an experiment on 90 Vassar students in which data were obtained on the speed and intensity with which former experiences of anger, fear, and joy could be revived. The results were correlated with the remoteness of the original emotional experiences. It was found that fear dates farther back than either joy or anger, and that anger tends to be of more recent date than joy. The more remote the original experiences the less intense are the revived emotions. The decrease in the intensity of a revived emotion with the passage of time is most marked for anger and least marked for joy. "Joy is more intensely revived than either fear or anger. . . . There is no relation between speed of recall of an emotion and the length of time that has elapsed since the original occurrence of the emotion. . . . Joy is more quickly recalled than either fear or anger," and "anger is most slowly recalled." The results suggested that P experiences are recalled more rapidly than U experiences. In the case of anger there is no relation between speed and intensity; in fear the more intense revivals seem to take longer; and in joy the more intense revivals are made more quickly.

In 1923 Fox (**39**) reported an experiment in which 24 men between 22 and 38 years of age learned four sonnets from Hardy's *Collected Poems* named "She to Him." Each *S* learned 2 sonnets, and the learning of each one was followed by a 2-minute rest. After this rest the memory for the sonnet was measured by the prompting method. The *S*'s were told to avoid thinking about the poems as far as possible, and after 1 week "they were allowed to read each sonnet through once, from beginning to end, and one minute later the amount of retention was determined, exactly as before." After this part of the procedure each *S* was required to state which of the 2 sonnets he preferred. It was found that regardless of whether learning had been by the whole method or by a variation of the

part method, and regardless of whether memory had been measured by immediate or by delayed recall, memory for the sonnets was more efficient in those cases where there was a subjective preference for what had been learned.

Wohlgemuth (**125**) described an experiment in 1923 in which 687 children between 11 and 16 years of age acted as *S*'s. On the day after a holiday the children were assembled in 2 groups of 403 and 284, and their 2 "head-mistresses" asked them to write down, first, all of the P experiences, and, second, all of the U experiences, which they had had on the holiday. On a second occasion, for one group 10 days later, and for the other group 14 days later, the two head-mistresses again asked the *S*'s to write down, first, all of the P experiences, and, second, all of the U experiences that they had had on the holiday in question. Some of the results were summarized as follows:

Pleasant experiences recorded in first paper	6735
Pleasant experiences forgotten in second paper	2700 = 40.1%
Unpleasant experiences recorded in first paper	3491
Unpleasant experiences forgotten in second paper	1406 = 39.8%

The last figure should be 40.3 instead of 39.8 if an error in calculation is corrected. The fact that the children said they had more P than U experiences might have been expected for these young *S*'s under the exceptional holiday conditions. The 40.1 and 40.3 per cents do not accurately represent the per cents of P and U experiences that were forgotten. They refer partly to the ability of the children on the second occasion to repeat what they had already written down 10 or 14 days before on the first paper, when they were allowed ample time to record their experiences and to think over what they had written.

Laird reported an experiment in 1923 (**62**) in which each of 62 beginning students in psychology at the University of Iowa wrote down as rapidly as possible the names of the first 10 acquaintances he could think of. This was followed by 40 minutes of regular class work, after which the *S*'s were unexpectedly asked to write down on another sheet of paper the names of 10 people, arranged in order of rank, with the person most liked at the beginning of the list and the person most disliked at the end. There were 620 names on the first (recall) lists, and 185 of these names also appeared later on the

second (liking and disliking) lists, giving a per cent of coincidence of about 30. The name of the most liked person, according to the order of names in the second list, had been given in the first (recall) list more than 5 times as often as the name of the most disliked person. The *S*'s were also diagnosed as optimistic, pessimistic, or of mixed temperament, by means of psychological sketches which they had written about themselves and about each other. Optimists and *S*'s of mixed temperaments included a larger number of names of liked people in their first (recall) lists than the pessimists. Using only the names of the 4 most liked people and the names of the 4 most disliked people (on the second lists), it was found that the following per cents of names were included in the first (recall) lists by the 3 groups of *S*'s.

	Names Which Had Been Included in the First (Recall) Lists	
	Four Best Liked People	*Four Most Disliked People*
Optimists	72%	15%
Mixed Temperaments	60%	18%
Pessimists	27%	45%

In 1924 Washburn, Deyo, and Marks (**119**) described an experiment with 92 Vassar students as *S*'s which was a repetition and extension of the study made in 1923 by Washburn, Field, and Wolf (**118**). Most of the results of the earlier investigation were confirmed, but the 1924 study did not confirm the earlier conclusion that "revivals are less intense the more remote the time position of the original emotion." In 1923 the conclusion was reached that "In the case of fear there is perhaps some tendency for the more intense revivals to take longer," and the 1924 investigation justified a more positive statement. In the later experiment, a study was also made of pride and shame, in addition to anger, fear, and joy. *Joy* is most intensely recalled; and it is also more quickly recalled than any of the other emotions, except pride. Joy tends to be recalled from recent dates, and it reaches high intensity quickly. *Anger* tends to be recalled from recent dates, and it is revived only in moderate intensity. It is frequently felt, but it is recalled more slowly than any of the other emotions. *Shame* tends to be recalled from early dates, and although

the average intensity of the recall is not very high, it is capable of being revived with more realistic vividness than any of the other emotions. *Pride* is next to shame and just above joy in the number of recalls having a vividness equal to that of the original experience. It "reaches its maximum intensity quickly, and does not tend to be recalled from very remote periods." *Fear* is the most weakly recalled, and it tends to be recalled from earlier dates. When fear "is intensely recalled, the process is relatively very slow." Almost none of the situations which could formerly produce fear would produce this emotion at the time of the experiment; but most of the situations which could formerly produce anger, pride, joy, and shame could still produce them at the time of the experiment, and were in many cases still active in the individual's experience.

In 1925 Flügel described a study (**37**) from University College, London, on the duration and intensity of P and U experiences in everyday life. A long set of instructions was drawn up, and each *S* was asked to keep a record of his feelings and emotions over a period of 30 days. The *S*'s said this routine was quite irritating and irksome; and the author remarked that "Although a larger number of subjects attempted the task, only 9 subjects completed records that covered the predetermined minimum of 30 days, and that appeared in all other respects to be satisfactory." All of the 9 *S*'s had been greatly influenced by Wm. McDougall's writings, and they had all had some psychological training. There were 5 men and 4 women, ranging in age between 19 and 42 years. Each *S* said there was a predominance of P experiences over U in his life. The author concluded that "Pleasure occupies a very considerably larger proportion of human life than does unpleasure." However, there was probably an optimistic selection of the recorded experiences by the *S*'s. There was ample opportunity for this factor of selection to operate, because the interval between records was frequently several hours long, and the *S*'s recorded only a small per cent of the total number of their P and U experiences. One naturally tries to avoid thinking about disagreeable experiences. Another defect in the experiment was the fact that those individuals who had a preponderance of disagreeable experiences did not continue such a U task for a period of 30 days and therefore did not serve as *S*'s; and the 9 individuals who did serve as *S*'s repre-

sented the more optimistic and exceptional individuals who survived. The records of those who did not continue as *S*'s were not used, and they are not even briefly commented upon by the author. Because of these and other limitations, it seems that the elaborate statistical treatment of the results was unnecessary.

Washburn, Giang, Ives, and Pollock (**120**) described an experiment in 1925, using 63 Vassar students as *S*'s, on the relation between the revivals of anger, joy, and fear,[2] on the one hand, and emotional and phlegmatic temperaments, on the other. A larger proportion of emotional than of calm *S*'s recalled many angers and fears; but about the same proportion of emotional and calm *S*'s recalled many joys. A decidedly larger proportion of calm than of emotional *S*'s recalled few angers, joys, and fears.

In 1929 Selz (**100**) reported the results of some experiments by Albin Herrmann and Alois Baumann on 2 groups of boys in the seventh school year, 1 group of 46 pupils being at the Württemberg *Stadtvolksschule*, and the second group of 78 pupils at another *Stadtvolksschule*. The average results showed a positive correspondence between the efficiency of learning 4 logical selections and the order of preference for these selections.

In connection with a study of annoyances which was published in 1930 (**19**), the writer made a brief attempt to study the common pleasures of everyday life. It appeared that the common pleasures were not as numerous or as strong as the common annoyances. It would be important to compare the results of a general investigation of common pleasures with the results that we obtained on common annoyances.

In a paper on P and U feelings published in 1930 (**20**), the writer brought together certain experimental and observational evidence which favored the view that the U activities of everyday life have a more positive character than the P, and that the U activities play a more important role in motivating conduct. P and U activities are not the psychological opposites of each other, and they are not located on the same psychological plane.

In 1930 Meltzer (**69**) reported a study in which 77 men and 55 women college students on a day following a Christ-

[2] See 118 and 119.

mas holiday were asked to describe briefly all of their experiences during the vacation, and to indicate which experiences had been P and which U. Six weeks after the exceptional holiday conditions, the same procedure was unexpectedly repeated. No distinction was made between the feelings during the original experience and the feelings which were present on recalling these experiences. Of the 2231 experiences recalled on the first occasion, 62% were graded P and 37% were graded U. After the interval of six weeks, 42% of the experiences which had been marked P on the first occasion were not recalled, and 60% of the experiences which had been marked U on the first occasion were not recalled. The 42% and 60% refer partly to the ability of the *S*'s on the second occasion to repeat what they had written down 6 weeks previously.

In 1930 Thomson (**111**) reported a study using 5 tests with 30 high school freshmen, and 3 tests with 100 high school sophomores, juniors, and seniors. The 5 tests were (1) recollecting experiences before beginning grammar-school, (2) recollecting experiences during grammar-school, (3) keeping a diary for 5 days and recalling the recorded experiences after intervals of 2 weeks and 1 month, (4) making up lists of 20 P and 20 U words and recalling the words after 1 month, and (5) reading 47 narrative poems and recalling their titles after 1 month. The group of 3 tests consisted of (1) diary records for 1 day, (2) word lists, and (3) current events. All tests were given by the regular school teachers in connection with the usual class work. The experiment extended over a period of 18 weeks, with an interval of at least 2 weeks between tests. The results favored the more ready recall of P experiences. A correlation of $-.02 \pm .15$ was obtained between an optimism-pessimism rating by fellow pupils and the pleasantness-unpleasantness ratio of the sum of the scores on the first group of 5 tests.

In 1930 Koch (**57**) reported the results of a study of the memory of 76 students in educational psychology for the percentage grades which they had received on ten 10-minute quizzes. After looking over the corrected examination paper which was given back to him at the following meeting of the class, the student returned the paper to the instructor and graded his emotional reaction to his mark on a scale extending from "1," which meant thrilled or very happy, to "5," which stood for utterly disgusted and discouraged. Five weeks

after the affective reaction to the last quiz had been recorded a recall of the 10 grades was requested. It was found that pleasing grades were in general recalled relatively more frequently than displeasing ones. P and U grades were remembered better than the more I grades.

In 1931 the writer (**21**) reported an experiment in which 439 males and 460 females between 10 and 90 years of age graded their most customary and representative feelings at 8 different periods during the day, on the different days of the week, and during the different months of the year. The feelings were graded by a scale on which *+5* represented the best anyone can feel, *—5* the worst anyone can feel, and *0* the approximate average feelings of the whole population. Since the *S*'s represented a good sampling of the population, it might have been expected that the average of all of the grades would be *0;* but there was a definite average tendency to overestimate the P feelings and to underestimate the U feelings. This optimistic tendency was clearly present in both sexes, in each of 8 age groups, in each of 9 different occupations, in the case of every period during the day, for every day of the week, and for every month of the year. The individuals engaged in each of the following occupations also gave average grades that were definitely above the assumed or theoretical average of the population: grammar-school children, high school children, college students, teachers, professional people, business men and women, clerical workers, housewives, unskilled laborers, skilled laborers, artists, nurses, newspaper editors and reporters, tailors, and farmers. The average scores which were obtained were above the theoretical or assumed average feelings of the population for the young as well as the old, for both the rich and poor, and for the educated as well as the uneducated. An average feeling-score was also calculated for each of the 899 *S*'s. A total of 685 *S*'s gave average feeling-scores above *O,* 86 gave average feeling-scores below *O,* and 128 gave average feeling-scores at *O.* It seems that optimism is a socially approved attitude to which all people are in some measure susceptible, and that the habit of overestimating P feelings and of underestimating U feelings is wide spread in the population. This general factor of optimism is of considerable importance in all of the investigations on the relative frequency and strength of P and U feelings in everyday life,

and on the question of the relative importance of P and U feelings in motivating conduct.

The studies which have been described above will be referred to again in Section 9 in connection with the general conclusions which seem justified on this subject of the learning and retention of P and U activities. In Sections 4, 5, 6, 7, and 8 we shall describe five experiments of our own, in which an attempt was made to fill in some of the important gaps in the experimental data. These experiments are briefly described; and a discussion of some of the results is included in Section 9, in connection with the general conclusions which seem justified from all of the experimental data.

Section 4.

EXPERIMENTAL. I. MEMORY FOR INCIDENTS AND EVENTS OF THE RECENT PAST

In the present experiment a study was made of memory for recent incidents and events which are fairly representative of everyday life. The *S*'s graded the feelings which they had had during the incident some 3 days after it occurred, and they also graded the feelings which were present while they recalled the incident 3 days and 24 days after it occurred. They also estimated the accuracy and completeness of their memory for the incident 3 days and 24 days after it occurred.

Subjects.—A total of 90 *S*'s was used, selected from among the students in the writer's classes. Fifty-five were taking courses in Physiological, Applied, or Introductory Psychology at the University of Rochester; and 35 were in a class in Abnormal Psychology at the University of Wisconsin. The first group of *S*'s was obtained April 29 and May 20, 1930, and the second group July 16 and August 5, 1930. The age and sex distribution of the *S's* was as follows:

Age	*Men*	*Women*
40-49	3	3
30-39	6	6
20-29	35	27
10-19	9	1
Total	53	37

Twenty of the *S*'s were in an extension course in Applied Psychology. Twenty-four were graduate students, and 66 were undergraduates.

Procedure.—The same procedure was used at Rochester and at Wisconsin; and since the results from the two groups were quite similar, the data from all of the *S*'s have been combined. After a preliminary explanation, the *S*'s were asked to recall several personal incidents, events, episodes, experiences, or activities which had occurred during the previous week. The incidents used were quite characteristic of the *S*'s, and were representative of their everyday experiences and activities. The *S*'s were asked to describe only the kind of incident that

had occurred frequently in their lives, and they were also instructed to include some incidents which had been quite P and some which had been quite U.

Each *S* described from 3 to 8 incidents; and each incident was given a title, and placed on a different sheet of paper. Enough detail was included in the description of each incident so that it could be recognized if it were read again several months later. The *S* then gave the following information about each incident on a separate sheet of paper:

1. The nature of his feelings during the original incident, using only one of the following letter-grades:

Scale I.
- *H* .... Extremely pleasant
- *T* .... ———————
- *K* .... Moderately pleasant
- *W* .... ———————
- *N* .... Slightly pleasant
- *R* .... Indifferent
- *V* .... Slightly unpleasant
- *L* .... ———————
- *G* .... Moderately unpleasant
- *S* .... ———————
- M .... Extremely unpleasant

In the above scale, *T* is half way between *H* and *K*, and *W* half way between *K* and *N*, etc.

2. The nature of his present feelings on recalling and thinking about the incident some 3 days after it occurred. In grading his present feelings he used Scale I. as before.

3. A judgment in regard to the accuracy and completeness of memory for the incident at the present time, using only one of the following letter-grades:

Scale II.
- *D* .... Perfect
- *Q* .... Almost perfect
- *J* .... Moderately good
- *Y* .... Poor
- *B* .... Very poor
- *P* .... No memory at all

4. Under similar conditions 3 weeks later the written descriptions of the incidents were returned to the *S*, and the second and third parts of the above procedure were repeated. The *S* graded his present feelings on recalling the incident about 24 days after it occurred, using one of the letter-grades of Scale I., as before. He also judged the accuracy and completeness of his present memory for the incident, again using one of the letter-grades of Scale II. The grades which the *S*'s

had given 3 weeks previously were withheld while the present judgments were being made. Before grading each incident the *S* read his earlier description of the incident, and assigned each grade carefully. Letter-grades were used to avoid the influence of suggestion, and in order to make it practically impossible for the *S* to remember the grades which he had given the incidents 3 weeks before. Several *S*'s said that in certain incidents their original feelings had been partly P and partly U, and in all such cases they were required either to divide the incident into 2 parts or to omit it altogether.

Results.—In order to treat the results quantitatively, the letter-grades of Scales I. and II. were changed into numerical grades, as follows:

Scale I.		Scale II.	
H	+5	*D*	5
T	+4	*Q*	4
K	+3	*J*	3
W	+2	*Y*	2
N	+1	*B*	1
R	0	*P*	0
V	—1		
L	—2		
G	—3		
S	—4		
M	—5		

A total of 479 incidents was described, and the total numbers and per cents of incidents which were P, U, or I on the 3 different occasions are as follows:

Feelings	*Pleasant*	*Indifferent*	*Unpleasant*
1. During Original Incident	258 (54%)	20 (4%)	201 (42%)
2. On Recalling Incident 3 Days Later	240 (50%)	110 (23%)	129 (27%)
3. On Recalling Incident 24 Days Later	215 (45%)	139 (29%)	125 (26%)

The per cents of the total number of incidents, or 479, are given in parenthesis. The per cent of P incidents decreases from 54 to 50 after 3 days, and from 54 to 45 after 24 days. The per cent of U incidents decreases from 42 to 27 after 3 days, and from 42 to 26 after 24 days. The per cent of I incidents increases from 4 to 23 after 3 days, and from 4 to 29 after 24 days. P and especially U experiences tend to become I as they are recalled on successive occasions. These tendencies are shown in some detail in Tables 1, 2, and 3.

TABLE 1

Relation Between Feelings During Original Incident and Feelings on Recalling Incident 3 Days After It Occurred

Feelings During Original Incident	*Feelings On Recalling Incident 3 Days After It Occurred*														
	+5	+4	+3	+2	+1	0	—1	—2	—3	—4	—5		*Av.*	*N*	*N*
+5	34	12	23	5	5	2						+5	+3.7	81	
+4	4	10	17	8	6	4						+4	+2.7	49	
+3	7	2	18	12	19	8	3					+3	+2.0	69	258
+2	1	1	1	1	7	6						+2	+1.2	17	
+1	1		8	3	4	23	2					+1	+0.8	42	
0		1	1		5	9	2	1	1			0	+0.3	20	20
—1			2	2	4	18	1	1	3	1		—1	—0.1	32	
—2				1		6	3	1	4			—2	—1.0	15	
—3			1	1	4	17	18	6	1	2	1	—3	—0.7	51	201
—4			2	1	2	4	6	5	8	1	1	—4	—1.3	30	
—5			3		1	13	15	2	19	5	15	—5	—2.2	73	
	+5	+4	+3	+2	+1	0	—1	—2	—3	—4	—5				
Av.	+4.5	+4.2	+2.9	+2.6	+1.7	—0.7	—3.0	—3.2	—3.8	—4.0	—4.8				
N	47	26	76	34	57	110	50	16	37	9	17				
N	240					110	129								479

TABLE 2

Relation Between Feelings During Original Incident and Feelings on Recalling Incident 24 Days After It Occurred

Feelings During Original Incident	*Feelings On Recalling Incident 24 Days After It Occurred*												*Av.*	*N*	*N*
	+5	+4	+3	+2	+1	0	—1	—2	—3	—4	—5				
+5	17	25	20	6	7	6						+5	+3.3	81	
+4		11	9	13	11	4	1					+4	+2.2	49	
+3	3	11	13	7	12	21	2					+3	+1.8	69	258
+2		1	2	3	3	8						+2	+1.1	17	
+1	1		9	5	2	22	1		2			+1	+0.9	42	
0	1			1		12	3	2	1			0	—0.2	20	20
—1			1	1	5	11	9	3	2			—1	—0.3	32	
—2					2	7	3	2	1			—2	—0.5	15	
—3			3		2	20	13	6	7			—3	—0.7	51	201
—4				1		9	4	3	9	2	2	—4	—1.8	30	
—5			1	2	4	19	13	6	11	10	7	—5	—1.7	73	
	+5	+4	+3	+2	+1	0	—1	—2	—3	—4	—5				
Av.	+4.3	+4.3	+3.0	+2.5	+1.8	—0.5	—2.5	—3.0	—3.5	—4.8	—4.8				
N	22	48	58	39	48	139	49	22	33	12	9				
N			215			139			125						479

TABLE 3

Relation Between Feelings On Recalling Incident 3 Days and 24 Days After It Occurred

Feelings on Recalling Incident 3 Days After It Occurred	*Feelings on Recalling Incident 24 Days After It Occurred*												*Av.*	*N*	*N*
	+5	+4	+3	+2	+1	0	—1	—2	—3	—4	—5				
+5	**10**	**16**	**12**	3	5	1						+5	+3.4	47	
+4	4	**10**	6	4	1	1						+4	+3.3	26	
+3	7	**10**	**16**	**13**	**17**	**11**	1		1			+3	+2.1	76	240
+2	1	7	6	5	6	7	1				1	+2	+1.8	34	
+1		4	**11**	6	**10**	**21**	3	1	1			+1	+1.1	57	
0		1	6	6	6	**63**	**16**	6	5	1		0	—0.1	110	110
—1					1	**22**	**13**	5	6	3		—1	—1.0	50	
—2			1			3	6	2	4			—2	—1.2	16	
—3				1	2	6	6	4	**10**	5	3	—3	—2.0	37	129
—4						1	1	2	3	1	1	—4	—2.6	9	
—5				1		3	2	2	3	2	4	—5	—2.4	17	
	+5	+4	+3	+2	+1	0	—1	—2	—3	—4	—5				
Av.	+4.0	+3.5	+2.6	+2.0	+2.0	+0.1	—1.0	—1.7	—2.0	—2.7	—3.4				
N	22	48	58	39	48	139	49	22	33	12	9				
N	215					139	125								479

Table I shows the changes in feelings after an interval of 3 days. In the central portion of the table the numbers which are as high as 5 have been printed in heavy type in order more clearly to represent the principal tendencies. When the incidents are recalled 3 days after they occurred, a few of the P experiences are even more P, and a few of the U experiences are even more U; but the most common change in feelings is for the P experiences to become less P and for the U to become less U after the 3-day interval. A number of the very P experiences remain equally P in recall, but relatively few of the U experiences remain equally U in recall. Only 5 of the incidents changed from P to U, but 24 changed from U to P. There is a tendency for the P experiences to change to I, but they seldom change to U. A somewhat larger number of the U experiences change to I, and a much larger number of the U experiences change to P.

Table 2 shows that similar changes occur in the relation between feelings during the original incident and feelings on recalling the incident 24 days after it occurred. The relation between the feelings on recalling the incident 3 days after it occurred and 24 days after it occurred is shown in Table 3. U feelings move farther towards the conditon of indifference than the P during this interval of 21 days.

The relations between feelings during the original incident and memory for the incident 3 days and 24 days after

TABLE 4

Relation Between Feelings During Original Incident and Memory for Incident 3 Days After It Occurred

Feelings During Original Incident		*Memory for Incident 3 Days After It Occurred*						*Av.*		*N*
		5	4	3	2	1	0			
	+5	25	36	18	1	1		+5	4.0	81
	+4	7	28	11	3			+4	3.8	49
	+3	8	28	32	1			+3	3.6	69
	+2	1	5	8	3			+2	3.2	17
	+1	6	10	22	4			+1	3.4	42
	0	4	4	10	2			0	3.5	20
	—1	8	6	11	5	2		—1	3.4	32
	—2	3	4	6	2			—2	3.5	15
	—3	9	13	24	4	1		—3	3.5	51
	—4	6	12	10	2			—4	3.7	30
	—5	23	33	16	1			—5	4.1	73
		5	4	3	2	1				
Av.		+0.1	+0.7	+0.3	—0.1	0.0				
N		100	179	168	28	4	0			479

TABLE 5
Relation Between Feelings During Original Incident and Memory for Incident 24 Days After It Occurred

Feelings During Original Incident		*Memory for Incident 24 Days After It Occurred*						*Av.*		*N*
		5	4	3	2	1	0			
	+5	**19**	**31**	**21**	6	4		+5	3.7	81
	+4	1	**16**	**25**	5	2		+4	3.2	49
	+3	3	**22**	**31**	**10**	2	1	+3	3.2	69
	+2	2	5	6	2	2		+2	3.2	17
	+1	2	**11**	**19**	7	3		+1	3.0	42
	0	1	3	9	4	2	1	0	2.7	20
	—1	2	9	**12**	6	3		—1	3.0	32
	—2	1	4	5	3	2		—2	2.9	15
	—3	4	**12**	**23**	8	3	1	—3	3.1	51
	—4	4	8	**12**	4	2		—4	3.3	30
	—5	**12**	**23**	**24**	7	4	3	—5	3.3	73
		5	4	3	2	1	0			
Av.		+0.4	+0.7	+0.4	+0.1	—0.1	—2.5			
N		51	144	187	62	29	6			479

it occurred are shown in Tables 4 and 5. The numbers in the central portion of these tables that are as high as 10 have been printed in heavy type. The incidents that were originally very P or very U seem to be remembered equally well, and both are remembered slightly better than the incidents which were originally I or only mildly P or U. There is no reliable difference between memory for incidents that were originally I and memory for incidents which originally were slightly or moderately P or U.

TABLE 6
Relation Between Feelings On Recalling Incident 3 Days After It Occurred and Memory For Incident 3 Days After It Occurred

Feelings on Recalling Incident 3 Days After It Occurred		*Memory for Incident 3 Days After It Occurred*						*Av.*		*N*
		5	4	3	2	1	0			
	+5	**19**	**20**	7	1			+5	4.2	47
	+4	4	**12**	**10**				+4	3.8	26
	+3	**10**	**37**	**25**	3	1		+3	3.7	76
	+2	8	**14**	9	3			+2	3.8	34
	+1	**10**	**20**	**26**	1			+1	3.7	57
	0	**21**	**23**	**50**	**13**	3		0	3.4	110
	—1	**10**	**20**	**16**	4			—1	3.7	50
	—2	1	4	9	2			—2	3.3	16
	—3	4	**18**	**14**	1			—3	3.7	37
	—4	3	5	1				—4	4.2	9
	—5	**10**	6	1				—5	4.5	17
		5	4	3	2	1	0			
Av.		+0.8	+1.0	+0.6	+0.4	+0.8	0.0			
N		100	179	168	28	4	0			479

TABLE 7

Relation Between Feelings On Recalling Incident 24 Days After It Occurred and Memory For Incident 24 Days After It Occurred

Feelings on Recalling Incident 24 Days After It Occurred		*Memory for Incident 24 Days After It Occurred*						*Av.*	*N*
		5	4	3	2	1	0		
	+5	11	7	3	1			+5	4.3	22
	+4	6	29	10		3		+4	3.7	48
	+3	6	29	19	3	1		+3	3.6	58
	+2	1	8	26	4			+2	3.2	39
	+1	1	12	25	7	3		+1	3.0	48
	0	10	18	57	30	19	5	0	2.7	139
	—1	6	15	20	5	2	1	—1	3.3	49
	—2	1	6	10	4	1		—2	3.1	22
	—3	5	9	12	7			—3	3.4	33
	—4	1	6	4	1			—4	3.6	12
	—5	3	5	1				—5	4.2	9
		5	4	3	2	1	0			
Av.		+1.1	+1.1	+0.5	—0.1	+0.5	—0.2			
N		51	144	187	62	29	6			479

The relations between feelings on recalling the incident 3 days and 24 days after it occurred and memory for the incident 3 days and 24 days after it occurred are shown in Tables 6 and 7. There is a definite tendency for the incidents that are very P or very U in recall to be remembered better than incidents that are I or almost I in recall.

SECTION 5.

EXPERIMENTAL. II. LEARNING AND RETAINING PLEASANT, INDIFFERENT, AND UNPLEASANT PAIRS OF WORDS

In the present experiment the paired associates method was used in measuring the relative efficiency of learning and retaining words that were mildly P, I, and mildly U.

Subjects.—A total of 27 *S*'s was used, and their sex and age distribution was as follows:

Age	*Men*	*Women*
40-49	1	
30-39	2	1
20-29	6	7
10-19	4	6
Total	13	14

Material.—In making up a list of words to be used as learning material we started with the 3000 most common words in the English language as given in Thorndike's *"Teacher's Word Book"* (1921). Hyphenated words, proper names, and words of less than 4 letters were excluded. When 2 different words had the same sound, or when two words were quite similar in meaning, the less common word was omitted. A number of words that were obviously nondescript, and several words which had a variety of meanings, were also omitted. Each of the 2000 words that remained was printed on a ½- by 1½-inch stiff card, and the words were independently classified by 13 judges (7 men and 6 women) into the three groups, P, U, and I. On the basis of these judgments, a selection was made of the 219 words that were most frequently and consistently P, of the 210 words that were most frequently and consistently U, and of the 255 words that were most frequently and consistently I. These 684 words are given in Table 8.

TABLE 8

Words Used as Learning Material

Abroad, absolute, accuse, accustom, ache, acre, admire, adopt, adventure, affection, afraid, alarm, alive, ambition, amount, anger, annual, anxious, approach, apron, area, arrange, arrive, article, ashamed, assign, assume, attack, autumn, away, awful.

Baby, ball, banquet, barrel, basin, bathe, beard, beast, beautiful, beggar, believe, bench, bird, bite, bitter, blacksmith, blame, blast, blind, blood, bloom, boast, boat, book, border, bore, borrow, brave, breeze, brick, bright, bring, broken, brook, broom, brother, bubble, bureau, burn, burst, bushel, butcher, butterfly, button.

Cabin, cake, calm, canal, candle, candy, carriage, cart, case, castle, cause, cease, cedar, central, charm, cheap, cheer, cheery, child, chill, choose, chop, clear, clerk, climb, cloak, closet, cloth, coast, coffee, cold, collar, college, colony, color, column, comfort, command, commence, commission, companion, compel, complain, conclude, condemn, confidence, confusion, connect, consider, constrain, continent, continue, contrary, control, conversation, cool, cord, cordial, corner, cottage, cotton, council, count, county, couple, courage, cover, coward, crawl, create, crime, cross, cruel, crush, cure, curse.

Daily, damage, damp, dance, dawn, dead, deaf, dear, death, debt, decay, deceive, decide, declare, defeat, defense, delicate, delight, deliver, demand, design, desire, desk, despair, despise, destroy, develop, different, difficult, dine, dirt, disappoint, discharge, disease, disgrace, dismiss, dispose, dispute, dissolve, distant, distinct, distress, doom, double, doubt, dozen, dread, dream, drown, drug, dull, dumb, dying.

Eager, elbow, element, embrace, enclose, encounter, enemy, entertain, envy, equal, error, establish, estate, esteem, evening, evident, evil, examination, example, excellent, exchange, exclaim, expect, expense, extend.

Factory, fail, faint, fall, false, family, famous, father, fault, favorite, fear, feast, feature, feeble, fence, fever, fight, fill, finger, float, flood, floor, flower, foam, follow, fond, fool, foot, forbid, force, forehead, forest, form, fortune, frame, free, freeze, freight, frequent, fret, friend, frighten, front, fruit, funeral, funny, furniture.

Gallop, garden, gaze, generation, generous, gentle, gift, girl, glad, glance, glide, globe, glow, gradual, grape, grass, grateful, grave, graze, grief, grind, groan.

Half, hall, hammer, hand, handle, handsome, hang, happiness, harbor, harm, harsh, hate, head, health, heap, heart, heavy, height, hero, hire, hiss, holiday, home, honest, honor, hood, hoof, hook, hope, horrible, hospital, howl, huge, humor, hungry, hurt.

Idea, ignorant, immediate, inch, include, indicate, injure, insect, insist, intend, interior, interrupt, issue.

Jealous, journey, joyful.

Kettle, kick, kill, kiss, knife.

Labor, lake, lame, lane, lark, late, laugh, lawn, lazy, league, length, letter, level, liberal, liberty, life, lift, light, load, local, locate, lock, lodge, look, loud, love, luck, lunch, lying.

Magnificent, main, maintain, majority, make, mankind, material, matter, mayor, meadow, meal, medicine, mention, merchant, merry, metal, middle, mistake, mock, moderate, moment, money, moon, morning, mother, mourn, move, murder, music.

Napkin, needle, nest, news, noise, none, noon, notion.

Obey, occasion, occur, ocean, odor, offense, operation, opinion, oppose, orchard, ounce, oven.

Pace, pack, pain, park, part, party, pause, peach, pencil, penny, period, phrase, pick, picture, pierce, pile, pillow, pitch, pity, plate, play, pleasant, pocket, poem, poison, pony, pool, poor, popular, population, possession, possible, power, praise, preach, precious, preparation, prevail, prevent, prisoner, process, product, pronounce, proportion, province, pudding, punish, push.

Quantity, quarrel, quarter, quiet.

Rage, rain, rainbow, range, rate, rattle, realize, receipt, refer, refuse, region, release, remain, render, reply, report, repose, represent, republic, resolve, respect, restless, result, revenge, review, reward, ride, ring, road, robber, robin, roof, root, rope, rude, ruin.

TABLE 8—Continued
Words Used as Learning Material

Sacred, salary, same, satisfy, savage, scarce, scare, scatter, scold, scratch, scream, search, section, seldom, send, settlement, severe, shame, sharp, shine, ship, shirt, shiver, shock, shoe, shoot, shriek, shun, sick, sign, silk, silver, sink, size, skate, slave, sleep, slumber, smile, smooth, snatch, snow, standard, star, social, song, sore, sorrow, spite, spoil, spoon, sport, spread, spring, squirrel, stain, start, step, stern, sting, store, story, stout, stove, strain, straw, stream, stretch, strict, strike, string, strip, strong, subject, substance, success, suffer, sufficient, summer, sunset, sunshine, supper, supply, surface, surprise, surround, sweet, swing, system.

Take, tall, temper, tender, term, terrible, territory, terror, test, theater, thief, thin, think, thread, threaten, three, together, toil, tool, toss, total, town, trade, trap, travel, tread, treasure, tree, tremble, trouble, truth, tumble, turn, twig, twilight.

Ugly, unhappy, universal, university, useless.

Vacation, valley, velvet, vest, victory, view, vigor, violence, voyage.

Wall, warm, water, weakness, wealth, weave, welcome, whip, wicked, wine, wipe, wire, wise, wish, wolf, wonderful, word, worm, wound, wreck, wrong.

Yard, year, young.

Zone.

Procedure.—1. Each *S* was taken individually, and the writer or his wife, Eloise B. Cason, was the *E* in all cases. The words in Table 8 were mixed together, and *S* picked up one card at a time, looked at the word for a moment, and classified it as P, U, or I if the word itself was P, U, or I to him, or if the immediate associations called out by the word were P, U, or I.

2. *E* arranged 4 sets of material, and each set consisted of 10 pairs of words that were P to *S*, 10 pairs that were U to *S*, and 10 pairs that were I to *S*. The pairs were irregularly arranged in each set, as P-P, U-U, I-I; U-U, P-P, I-I; U-U, I-I, P-P; etc. Each of the 4 sets, of 30 pairs each, was placed on a stiff cardboard, and a key showing which pairs were P, U, and I to *S* could be folded out at the side for *E* but folded out of sight for *S*.

3. *S* was handed a set of the material, with directions to associate the words in each pair in the forward direction. He was instructed to distribute his practice equally between the different pairs. *S* was given from 3 to 5 min. to study each set.

4. *E* then tested *S*'s learning orally, and the pairs were taken in an irregular order. When *S* could not give the second word in a pair, *E* prompted him by repeating both of the words. *S* was instructed to try to learn all pairs that were missed.

5. Procedures 3 and 4 were followed with the 3 remaining sets of material.

6. After a rest of about 5 min., and some 25 min. after the first test, for Learning, *S* was again tested for his retention of the 120 pairs. He was prompted each time he could not give the second word in a pair, and was again instructed to continue trying to learn all of the pairs.

7. A typewritten copy was made of the pairs of words. *S*'s retention was tested again by the same procedure after one day. The retention of the pairs of words was tested for the last time 16 days later.

TABLE 9

Relative Ranks of P, I, and U for Different Subjects in Learning and Retaining the Pairs of Words

Rank		1	1½	2	2½	3	*Rank Order*
Learning N=27	P	21	1	3	1	1	1
	I	4	1	13	2	7	2
	U	1		7	3	16	3
Retention After 25 Minutes N=27	P	17	7	2		1	1
	I	2	7	11	2	5	2
	U	1		5	2	19	3
Retention After One Day N=26	P	19	1	5		1	1
	I	6	1	11	2	6	2
	U			7	2	17	3
Retention After 16 Days N=22	P	15	2	5			1
	I	5	2	5	6	4	2
	U			4	6	12	3

Results.—Table 9 shows the relative ranks of P, I, and U pairs of words on the 4 different occasions. A total of 21 *S*'s out of 27 learned the P pairs more efficiently than the U or I pairs. In the first test, for Learning, the U pairs were third for 16 *S*'s out of 27. The relative rank in learning the I pairs was a tie between second and third places (a rank of 2½) for 2 *S*'s out of 27. On each of the 4 tests, Learning, Retention After 25 Minutes, Retention After One Day, and Retention After 16 Days, the relative rank was consistently P, I, and U.

The combined results of all of the *S*'s are shown in Table 10. In the first test, for Learning, the *S*'s learned an average of 5.5 P pairs out of a possible 10, an average of 4.6 I pairs out

TABLE 10

Relative Efficiency of Learning and Retaining P, I, and U Pairs of Words: Combined Results

		P	I	U
Learning	N	108	108	108
	Av.	5.5±.15	4.6±.15	4.2±.15
	S. D.	2.29	2.37	2.30
Retention After 25 Minutes	N	107	107	107
	Av.	5.6±.17	4.6±.16	4.0±.15
	S. D.	2.67	2.52	2.31
Retention After One Day	N	102	102	102
	Av.	5.7±.17	4.7±.16	3.9±.17
	S. D.	2.62	2.43	2.52
Retention After 16 Days	N	87	87	87
	Av.	3.5±.15	2.7±.14	2.1±.13
	S. D.	2.07	1.95	1.76

of a possible 10, and an average of 4.2 U pairs out of a possible 10. On all 4 tests, the P pairs were learned and retained more efficiently than the I pairs, and the I pairs were learned and retained more efficiently than the U pairs. The differences, P-U, P-I, and I-U, and their probable errors, are given in Table 11.

TABLE 11

Differences Between the Average Scores for P, I, and U Pairs of Words: Data from Table 10

	P-U	P-I	I-U
Learning	+1.3±.21	+0.9±.21	+0.4±.21
Retention After 25 Minutes	+1.6±.23	+1.0±.23	+0.6±.22
Retention After One Day	+1.8±.24	+1.0±.23	+0.8±.23
Retention After 16 Days	+1.4±.20	+0.8±.21	+0.6±.19

Section 6.

EXPERIMENTAL. III. A FURTHER STUDY OF LEARNING AND RETAINING PLEASANT, INDIFFERENT, AND UNPLEASANT PAIRS OF WORDS

After obtaining the results described in the preceding section, certain changes were made in the material and procedure in order to determine whether these changes would produce any significant difference in the results.

Material.—A study of the words used in Experiment II., and given in Table 8, showed that a relatively large per cent of the P words and a relatively small per cent of the U words were nouns, and that a relatively small per cent of the P words and a relatively large per cent of the U words were verbs. The per cents of nouns, verbs, and adjectives for the words in Table 8 were approximately as follows:

	P	*I*	*U*
Nouns	66	58	40
Verbs	16	33	38
Adjectives	18	9	22

Since paired nouns are more easily associated with each other than paired verbs, this inequality in the material may have been sufficient to account for the obtained P-I-U order of efficiency in learning and retaining the different pairs of words. The average number of letters in the words in Table 8 was, for P words 5.75, for I words 5.92, and for U words 5.55. This difference in the length of the P, I, and U words could not have been the determining factor in producing the results obtained.

The words given in Table 12 were used in the present study. In this list there is a total of 468 words; and in each of the three groups, P, I, and U, there are 72 words that are practically always used as nouns, 47 that are practically always used as verbs, and 37 that are practically always used as adjectives. The relative advantages of parts of speech are therefore approximately equal for the P, I, and U words. The average number of letters in the words of Table 12 is, for U words 5.69, for I words 6.15, and for P words 5.99. A study of the

TABLE 12
Words Used as Learning Material

Absent, absolute, accomplish, accustom, acquire, admire, adopt, affection, afford, agree, alive, amaze, anger, annual, appoint, apron, army, arrange, arrive, article, assign, assume, assure, attend, avoid.

Baby, bake, barrel, basin, bathe, beard, beast, beautiful, beggar, believe, belong, bench, bless, blood, bloom, boat, bone, book, borrow, brave, brick, bright, bring, brook, broom, brother, bureau, burst, butcher, butterfly.

Cabin, cake, calm, canal, candle, candy, carriage, case, castle, cease, celebrate, charity, charm, cheap, cherry, choose, civil, clear, clerk, closet, cloth, cloudy, coffee, cold, collar, college, colony, color, column, commence, commend, companion, compel, complain, complete, conceal, conclude, condemn, confess, confusion, connect, conscience, consider, construct, continue, conversation, convince, cord, cotton, council, county, couple, courage, coward, crawl, create, creep, crush, crime, cultivate.

Dame, damp, danger, dead, death, debt, decide, declare, defense, defy, delicate, delight, deliver, deny, despise, destroy, develop, devil, devote, different, difficult, dine, direct, dirt, disappear, disappoint, disease, disgrace, dismiss, dispose, dissolve, distant, distinct, doom, dozen, droop, drown, dumb, duty.

Eager, earn, elate, elbow, elder, element, enclose, encourage, enemy, entertain, entire, equal, error, establish, estate, evident, examination, excellent, exclaim, expect, expense, extend, factory, faint, family, famous, fault, favorite, feast, feel, fellow, fever, fierce, finger, first, flight, float, flower, follow, fond, forget, fortune, forward, free, freeze, freight, frequent, frighten, fruit, funeral, funny.

Gallop, generation, generous, gentle, ghost, girl, give, glide, globe, gradual, grape, grass, grateful, graze, greet, grief.

Hall, handsome, hang, harbor, hard, harsh, haste, heart, heavy, height, hero, honest, hoof, horn, horrible, hospital, huge, hungry.

Idea, ignorant, immediate, improve, inch, include, injure, insect, insist, intend, interior, interrupt.

Jealous, joyful.

Knife.

Lame, lane, large, late, lazy, leap, letter, life, like, linger, locate, loose, lower, luck, lunch.

Magnificent, maintain, make, mankind, marry, matter, mayor, meadow, meal, medicine, merchant, merry, metal, middle, moderate, moment, moral, mouse.

Narrow, necessary, needle, nest, noise, noon.

Obey, occasion, occur, ocean, odor, offense, onion, operation, opinion, oppose, orchard, ounce, outside.

Party, payment, period, picture, pierce, pistol, plate, pleasant, poem, pony, poor, popular, possession, possible, power, preach, precious, prefer, preparation, prevail, prevent, priest, prisoner, process, product, pronounce, propose, provoke, pudding.

Quantity, queer, quiet.

Rage, realize, recent, recover, refer, refine, remain, remember, render, repeat, represent, require, resign, restless, restrain, revenge, road, robber, robin, roof, root, rope, round, rude.

Sacred, salary, same, satisfy, save, scatter, section, seize, send, settlement, severe, shake, sharp, shine, shoe, shoot, shun, sick, silk, silver, single, slave, small, smooth, social, sore, sorrow, special, spoil, spoon, sport, squirrel, standard, story, stout, stove, straight, straw, stream, string, strong, stump, suffer, sufficient, supper, sure, surface, surround, sweep, sweet, sword, system.

Take, tall, task, temper, tender, term, terrible, terror, thank, thief, thin, think, thirst, thorough, threaten, thunder, tool, tooth, toss, total, treasure, tree, trial, truth, twig, twilight.

Ugly, understand, unhappy, universal, university, unknown, useless.

Vacation, velvet, vest, violence.

Wall, warm, water, weakness, wealth, weapon, weight, wicked, wide, wipe, wise, wolf, wonderful, word, worm.

Year, young.

frequency of the words in everyday usage as given in Thorndike's *Teacher's Word Book* showed that the P words are most commonly used, the I words less commonly used, and the U words least commonly used. All of the words, however, are among the 3000 most common words in the English language.

Procedure.—The present procedure differed from that used in the preceding experiment in the following respects:

1. *S* was given the words in Table 12; each word being printed on a separate card, and all words mixed together. He classified the words in 5 groups, Quite P, Slightly P, I, Slightly U, and Quite U according to his own personal reactions.

2. *E* arranged 3 sets of material, each set consisting of 25 pairs of words, and in each set there were 5 pairs in each of the 5 groups named above.

3. The material in a single set was presented orally 1, 2, or 3 times, and the pairs of words in a single set followed each other in an irregular order at intervals of either 5, 7½, or 10 sec. *S* was instructed to distribute his study and effort equally between all of the pairs in a single set of material, and to try to connect the words in each pair in the forward direction only during the time interval intended for that pair. A special effort was made to have *S* distribute his practice equally between the 5 different kinds of words, and the conditions seemed to be as nearly equally favorable for the 5 different groups of words as they could be made.

4. *E* then tested *S*'s learning orally, and the pairs were taken in an irregular order. When *S* could not give the second word in a pair, *E* prompted him by repeating both of the words, and on this occasion a time interval of about 5 sec. was allowed to study the pair. *S* was instructed to try to learn all of the pairs that had been missed.

5. A typewritten copy was made of the 3 sets of material. *S*'s retention of the pairs of words was tested after an interval of one day.

A number of precautions were taken so that during the oral presentation of the words, during the test for Learning, and during the test for Retention, *E* would not know which pairs of words the *S* had judged Quite P, Slightly P, I, Slightly U, and Quite U. Every possible control was used so that the conditions would be equally favorable for learning and retaining the pairs of words in the 5 different groups.

Subjects.—A total of 50 *S*'s was used, and their sex and age distribution was as follows:

Age	*Men*	*Women*
30-34	3	4
25-29	3	1
20-24	12	11
15-19		16
Total	18	32

TABLE 13

Relative Ranks of P, I, and U for Different Subjects in Learning and Retaining Pairs of Words

Rank			1	1½	2	2½	3	3½	4	4½	5	*Av. Rank*	*Rank Order*
Learning N=50	Quite	P	26	7	4	4	2	2	1	0	4	1.83	1
	Slightly	P	7	4	3	4	6	7	8	2	9	3.15	3
		I	5	4	5	6	7	6	7	2	8	3.10	2
	Slightly	U	0	1	3	3	9	11	10	4	9	3.67	5
	Quite	U	3	2	7	7	7	6	6	2	10	3.25	4
Retention After One Day N=50	Quite	P	14	6	10	5	5	1	2	6	1	2.28	1
	Slightly	P	8	3	4	11	6	5	5	6	2	2.81	3
		I	11	7	7	8	5	2	2	3	5	2.48	2
	Slightly	U	2	1	3	3	5	3	9	12	12	3.85	5
	Quite	U	1	3	2	5	7	9	7	6	10	3.59	4

Results.—Table 13 shows the relative ranks of the 5 kinds of words in Learning, and in Retention After One Day. A total of 26 *S*'s out of 50 learned the Quite P pairs more efficiently than the 4 other kinds of pairs. The relative rank in learning the Quite P pairs was a tie between first and second places (a rank of 1½) for 7 *S*'s out of 50. The average rank in the efficiency of learning and retaining the 5 kinds of words is shown in next to the last column of the table. The combined resulting order of rank is given in the last column. On each of the 2 occasions, Learning, and Retention After One Day, the relative rank order was Quite P, I, Slightly P, Quite U, and Slightly U.

TABLE 14

Relative Efficiency of Learning and Retaining P, I, and U Pairs of Words: Combined Results

		Quite P	*Slightly P*	I	*Slightly U*	*Quite U*
Learning	N	149	149	149	149	149
	Av.	3.37 ± .07	2.72 ± .08	2.79 ± .07	2.52 ± .07	2.67 ± .07
	S. D.	1.23	1.43	1.32	1.31	1.31
Retention After One Day	N	147	147	147	147	147
	Av.	2.14 ± .08	1.99 ± .08	2.09 ± .08	1.58 ± .08	1.65 ± .07
	S. D.	1.35	1.43	1.38	1.37	1.32

The combined results of all of the *S*'s are shown in Table 14. In the test for Learning the *S*'s learned an average of 3.37 Quite P pairs of words out of a possible 5, but in the test for Retention they retained an average of only 1.58 Slightly U and an average of only 1.65 Quite U pairs of words out of a possible 5. It appears that the Quite P pairs of words were learned more efficiently than the 4 other groups of words, the difference being at least .58 ± .10; and that the Slightly U and Quite U pairs of words were retained less efficiently than the 3 other groups of words, the difference being at least .34 ± .10. These results seem to favor the superior efficiency of learning Quite P pairs of words and the inferior efficiency of retaining Slightly U and Quite U pairs of words.

It is difficult to understand why the Quite P pairs of words were learned more efficiently than the 4 other groups of words; or, if this be true, why the I words were learned more efficiently than the Slightly P words. The differences between the average scores for learning the Slightly P, I, Slightly U, and Quite U pairs of words are not reliable. It is also not entirely clear why the differences between the average scores for retaining Quite P, Slightly P, and I pairs of words are not reliable, nor is it any more apparent why the efficiency of retaining the Slightly U and the Quite U pairs of words is reliably inferior to the efficiency of retaining the words in the 3 other groups. The order of efficiency for Learning is P-I-U, as in Experiment II. described in the preceding section, but the order of efficiency in Retention in the present study is I-P-U. The 2 experiments combined show that changing the material and procedure does produce a definite difference in the results.

Although we are not prepared to explain all of the results obtained in the present experiment, it may still be useful to make a few interpretative suggestions. The average number of letters in the words used was, for P words 5.99, for I words 6.15, and for U words 5.69. This factor may have produced a difference in the results, but not a difference in the direction obtained. The order of frequency or commonness of the words in everyday usage was P-I-U; and although this factor favored the P-I-U order in both Learning and Retention, it alone could not explain the obtained difference between the orders of efficiency in Learning and in Retention.

Since the averages in Table 14 are irregular and the probable errors large, it seems more likely that the true explanation is to be found in certain disturbing factors in the procedure which we were unable to control. Although an attempt was made to have the *S* distribute his practice and effort equally between the 5 groups of words, he was doubtless most interested in the Quite P group of words, probably paid better attention to them, and as a result formed connections between them more efficiently. In order to connect 2 words it is necessary to think about the associations called out by the words. There was a natural tendency to think about the P associations of the P words and to avoid thinking about the U associations of the U words. It seems that the difference between the average scores of the Quite P and the 4 other groups of words can be partially explained by this difference in interest, attention, and practice which was given the different pairs of words. It is difficult to understand how this factor can be entirely eliminated in the ordinary procedure with verbal material.

In the course of the test for Learning, *S* was prompted when he could not give the second word in a pair, and an interval of 5 sec. was allowed for him to try to form the connection. With this prompting procedure *S* practised the Quite P pairs of words less than the pairs of words in the 4 other groups. This factor may have been sufficient to equalize the relative efficiency of reproducing the Quite P, Slightly P, and I pairs of words after an interval of one day. The inferior efficiency of reproducing the Slightly U and Quite U words may be due to the fact that the *S*'s were not particularly inclined to pay attention to the U associations of these words during the prompting procedure. The *S*'s were instructed to try to form connections between the words of all of the pairs that were missed, but it is quite unlikely that they paid as close attention or put forth the same effort with the Slightly U and Quite U pairs of words as with the words in the 3 other groups.

The above considerations tend to minimize the differences shown in Table 14; and the most plausible conclusion seems to be that there is little, if any, difference in the relative efficiency of learning and retaining P, I, and U pairs of words.

SECTION 7.

EXPERIMENTAL. IV. RECALLING INCIDENTS AND EXPERIENCES OF THE PAST

The present study is similar to the 1914 investigation by Peters and Němeček (**80**), except that our *S*'s were taken individually and more care was used in controlling the experimental conditions.

Procedure.—Each *S* was given the following typewritten instructions which he read carefully and discussed with the *E*.

EXPERIMENT ON RECALLING INCIDENTS AND EXPERIENCES

You are asked to coöperate in the present experiment on the relation between feelings and memory in the belief that the information that you will give will be of definite value. Your part in the study consists in recalling incidents, events, and experiences from your past life, and assigning certain grades. The incidents may be chosen from any period in the past, but it is desirable to select incidents that have been more or less distributed over your whole life period. The incidents and experiences should be fairly representative of your past life. Recall some that were pleasant when they originally occurred and recall some that were unpleasant when they originally occurred. Frankness in recalling and describing the incidents and experiences is desired, and you are requested to be accurate and careful in grading each incident. None of the details that you may mention will be repeated. The following procedure is to be used for each incident or experience.

Recall some incident or experience from your past life, and describe it briefly for the experimenter. Think about it and describe it freely.

Grade the feelings that were present during the original incident, using one of the following letter-grades:

W....Quite Pleasant
L....Slightly Pleasant
R....Indifferent
T....Slightly Unpleasant
M....Quite Unpleasant

Grade your feelings which are now present as you recall the incident, using the above scale.

How long ago did the incident occur? Use one of the following numerical grades:

1....Less Than 1 Wk. Ago
2....1 Wk.-1 Mo.
3....1 Mo.-6 Mos.
4....6 Mos.-1 Yr.
5....1 Yr.-5 Yrs.
6....5 Yrs.-10 Yrs.
7....10 Yrs.-20 Yrs.
8....More Than 20 Yrs. Ago

How frequently have you recalled the incident on the average since it originally occurred? Use one of the following letter-grades:

A....More Frequently Than Once a Month
B....Once a Month to Once a Year
C....Less Frequently Than Once a Year

S gave an oral description or account of the incident, the account lasting from 30 to 60 secs., and he recalled enough concrete detail so that there was no doubt but that the incident itself had been actually recalled. While *S* was describing the incident *E* wrote down a brief title. In a few exceptional cases *S* did not describe the incident orally, but was allowed to think about it silently for a few moments. During this procedure *E* sat to the side facing at right angles to *S*'s line of regard, *E* being occupied mainly with making a record of the title and the 4 gradings for each incident.

In grading the feelings that were present during the original incident and the feelings that were present on recalling the incident, *S* was instructed to think of all his P experiences as being divided into two groups, more P and less P, the two groups being approximately equal as far as the number of incidents was concerned. *S* was instructed to grade the more P half "W" ("Quite Pleasant") and the less P half "L" ("Slightly Pleasant"). He was likewise instructed to think of all his U experiences as being divided into two groups that were equal as far as the number of incidents was concerned, a less U half to be graded "Slightly Unpleasant" and a more U half to be graded "Quite Unpleasant."

E gave no instructions in regard to the kind of topics with which the incidents should deal, or on the relative number of P, I, and U incidents that should be recalled. He occasionally stopped *S* when he showed a tendency to spend too much time in describing an incident, and *E* sometimes asked him to give more details about the incidents. *E* occasionally reminded *S* that the kind of incidents that were desired were representative incidents distributed more or less uniformly over *S*'s life period. Those who served as *E*'s were convinced of the desirability of having the experiment carried out individually so that there could be greater assurance that *S* was following the directions.

After describing an incident and assigning the 4 grades, *S* proceeded with as little delay as possible to describe another incident, and he gave himself whatever stimuli were necessary in recalling these incidents. The experiment continued for a period of approximately 2 hrs. for each *S*. In the case of almost ⅓ of the *S*'s, some difficulty was experienced in recalling the incidents after the experiment had been in progress

for about an hour, or 1½ hrs. In these cases there was a definite blocking and difficulty in recall during the latter part of the experimental period, and the successive incidents were recalled only with some effort and frequently after some delay.

Experimenters and Subjects.—Eleven individuals assisted in the experiment by serving as *E*'s, and their names and the number of *S*'s of each sex they conducted through the experiment are as follows:

Experimenter	*No. of Subjects*	
	Men	*Women*
Miss Catherine M. Dunegan	11	17
Mrs. Eloise B. Cason	5	4
Mr. Carl E. Johnson	6	2
Mr. Hulsey Cason	4	3
Miss Mabel F. Rudisill		5
Miss Evelyn M. Gunn	2	2
Mr. Chester G. Lampert	4	
Mr. John B. Cluley	3	
Mr. Anthony C. Walvoord	3	
Miss Betty Jacobs		2
Miss Rose E. Parker		1

Seven of the *E*'s were graduate students in psychology at the University of Wisconsin; and 2 were undergraduate majors in psychology. The procedure was at first carefully explained to all of the *E*'s as a group so that the conditions of the experiment for the different *S*'s would be as uniform as possible.

The 74 *S*'s were mostly graduate and undergraduate students in psychology, and their age and sex distribution was as follows:

Age	*Men*	*Women*
60-64		1
55-59		
50-54	1	
45-49		1
40-44		1
35-39	3	2
30-34	4	2
25-29	4	3
20-24	20	13
15-19	6	13
Total	38	36

Results.—In order to treat certain of the results quantitatively, the letter-grades used in grading the feelings and in grading the frequency of the incidents were changed into numerical grades as follows:

W	(Quite Pleasant)	+2
L	(Slightly Pleasant)	+1
R	(Indifferent)	0
T	(Slightly Unpleasant)	—1
M	(Quite Unpleasant)	—2
A	(More Frequently Than Once a Month)	3
B	(Once a Month to Once a Year)	2
C	(Less Frequently Than Once a Year)	1

A total of 6,143 incidents was described by the 74 *S*'s, and 24,572 grades were assigned these incidents.

TABLE 15

Feelings During Original Incident, the Series of Incidents Reported by Each Subject Being Divided into Successive Fifths: Combined Results (74 Subjects and 6143 Incidents)

Fifths	*Quite P* W(+2)	*Slightly P* L(+1)	*Indifferent* R(0)	*Slightly U* T(—1)	*Quite U* M(—2)	*N*	*Av.*
1	394 6.4%	180 2.9	50 0.8	189 3.1	415 6.8	1228 20.0	—0.04
2	425 6.8	208 3.4	44 0.7	190 3.1	363 5.9	1230 20.0	+0.12
3	445 7.2	214 3.5	34 0.6	204 3.3	331 5.4	1228 20.0	+0.19
4	390 6.3	236 3.8	43 0.7	226 3.7	333 5.4	1228 20.0	+0.10
5	424 6.9	243 4.0	43 0.7	228 3.7	291 4.7	1229 20.0	+0.23

TABLE 16

Feelings Present on Recalling Incident, the Series of Incidents Reported by Each Subject Being Divided Into Successive Fifths: Combined Results (74 Subjects and 6143 Incidents)

Fifths	*Quite P* W(+2)	*Slightly P* L(+1)	*Indifferent* R(0)	*Slightly U* T(—1)	*Quite U* M(—2)	*N*	*Av.*
1	221 3.6%	371 6.0	373 6.1	157 2.6	106 1.7	1228 20.0	+0.36
2	201 3.3	377 6.1	370 6.0	176 2.9	106 1.7	1230 20.0	+0.32
3	193 3.1	412 6.7	401 6.5	135 2.2	87 1.4	1228 20.0	+0.40
4	184 3.0	393 6.4	431 7.0	149 2.4	71 1.2	1228 20.0	+0.63
5	183 3.0	406 6.6	404 6.6	176 2.9	60 1.0	1229 20.0	+0.39

TABLE 17

Recency or Remoteness of Incident, the Series of Incidents Reported by Each Subject Being Divided into Successive Fifths: Combined Results (74 Subjects and 6143 Incidents)

Fifths	<1 *Wk. Ago* 1	1 *Wk.*- 1 *Mo.* 2	1 *Mo.*- 6 *Mos.* 3	6 *Mos.*- 1 *Yr.* 4	1 *Yr.*- 5 *Yrs.* 5	5 *Yrs.*- 10 *Yrs.* 6	10 *Yrs.*- 20 *Yrs.* 7	>20 *Yrs. Ago* 8	*N*	*Av.*
1	27	37	62	103	277	231	389	102	1228	5.71
	0.4%	0.6	1.0	1.7	4.5	3.8	6.3	1.7	20.0	
2	30	44	78	135	402	200	260	81	1230	5.34
	0.5	0.7	1.3	2.2	6.5	3.3	4.2	1.3	20.0	
3	42	47	108	147	375	218	243	48	1228	5.14
	0.7	0.8	1.8	2.4	6.1	3.5	4.0	0.8	20.0	
4	44	55	136	180	380	189	192	52	1228	4.95
	0.7	0.9	2.2	2.9	6.2	3.1	3.1	0.8	20.0	
5	52	71	144	204	362	165	185	46	1229	4.80
	0.8	1.2	2.3	3.3	5.9	2.7	3.0	0.7	20.0	

TABLE 18

Frequency of Recalling Incident, the Series of Incidents Reported by Each Subject Being Divided Into Successive Fifths: Combined Results (74 Subjects and 6143 Incidents)

Fifths	*More Than Once a Mo. A(3)*	*Once a Mo. to Once a Yr. B(2)*	*Less Than Once a Yr. C(1)*	*N*	*Av.*
1	162 2.6%	483 7.9	583 9.5	1228 20.0	1.66
2	162 2.6	502 8.2	566 9.2	1230 20.0	1.67
3	183 3.0	484 7.9	561 9.1	1228 20.0	1.69
4	191 3.1	521 8.5	516 8.4	1228 20.0	1.74
5	191 3.1	545 8.9	493 8.0	1229 20.0	1.75

In Tables 15, 16, 17, and 18, the series of incidents reported by each *S* has been divided into successive fifths in order to determine whether the blocking and difficulty in recall which occurred in about ⅓ of the *S*'s had any influence on the results. If subject L, for example, recalled 100 incidents, his first 20 incidents comprised his first fifth, and if subject M recalled 75 incidents his first 15 incidents comprised his first fifth, and so on. The average scores of each fifth for the 74 *S*'s combined are given in each of the 4 tables. The distributions do not follow the normal curve of distribution, but with the scores which were obtained the probable error of the average is .03 for the averages of Tables 15, 16, and 17, and .01 for the averages of Table 18. The lower figure in each pair in the central portion of the tables represents the per cent the number in question is of the total number of scores, or 6143.

Table 15 shows the feelings during the original incident. There were 394 or 6.4% of grades of +2 in the first fifth, 425 or 6.8% of grades of +2 in the second fifth, etc. In spite of the fact that the *S*'s frequently became fatigued and bored as the experiment progressed, there was a slight tendency for them to recall incidents that were more P (or less U) when they originally occurred. The combined average for the first three-fifths is +0.09 and the combined average for the last two-fifths is +0.16. This result seems to suggest that when there is some blocking or difficulty in recall, incidents that were P when they originally occurred have a slight advantage

in the readiness of recall over incidents that were U when they originally occurred. But in view of the large number of individual variations and the small size and unreliable and irregular nature of the differences, it seems more justifiable to conclude, at least as far as these results are concerned, that incidents that were P when they originally occurred have no special advantage in the readiness or ease of recall over incidents that were U or I when they originally occurred.

Similar results were obtained for the feelings that were present on recalling the incident, and the construction of Table 16 is similar to that of the preceding Table 15. When there is some blocking or difficulty in recall, as in the fourth and last fifths, incidents that were P in recall, I in recall, or U in recall have no special advantages over each other in the readiness or ease of recall.

Table 17 gives the scores of each fifth for the recency or remoteness of the incident. The *S*'s were instructed to recall incidents that were distributed more or less evenly over their past lives, but they received no directions as to whether they should recall recent or remote incidents at the beginning or at the end of the experimental period. The average remoteness scores of the incidents decreases definitely in passing from the first to the last fifth, the average scores for the succeeding fifths being 5.71, 5.34, 5.14, 4.95, and 4.80. The differences between these average scores for the successive fifths are, .37, .20, .19, and .15. The *E*'s were surprised at the marked tendency of practically all *S*'s to recall a relatively large number of remote incidents. The total per cents of recalled incidents, when the incidents occurred less than one week ago, less than one month ago, etc., were as follows:

Recalled Incidents Which Occurred	*Total Per Cent*
Less Than One Week Ago.....	3.2
Less Than One Month Ago.....	7.3
Less Than Six Months Ago.....	15.9
Less Than One Year Ago.....	28.4

Table 18 gives the scores of each fifth for the frequency of recalling the incident. The average frequency with which the incident had been recalled seems to increase slightly in passing from the first to the last fifth, the scores being 1.66, 1.67, 1.69, 1.74, and 1.75.

The results of Tables 17 and 18 indicate that when there is some blocking or difficulty in recall, incidents tend to be recalled which occurred more recently and which have already been recalled more frequently. The incidents that were recalled during the blocking which sometimes occurred in the fourth and last fifths were easier to recall than the incidents that were recalled in the first three-fifths when there was no special blocking or difficulty in recall. If this result is considered in connection with the results of Tables 15 and 16, it appears that the relative number of incidents that were P or U when they originally occurred, or which were P or U when they were recalled, is approximately the same for those incidents that were easily and readily recalled, and also approximately the same for those incidents that were recalled only after some blocking or difficulty in recall. Among the groups of incidents that are easily recalled, or among those that are recalled only with difficulty, the incidents which were P when they originally occurred or which were P when they were recalled have no special advantages or disadvantages over those that were U when they originally occurred or which were U when they were recalled.

TABLE 19

Relation Between Feelings During Original Incident and Feelings on Recalling Incident: Combined Results (74 Subjects and 6143 Incidents)

		Feelings on Recalling Incident					*N*	*Av.*
		W +2	*L* +1	*R* 0	*T* —1	*M* —2		
Feelings During Original Incident	W +2	807 13.1%	882 14.4	314 5.1	49 0.8	26 0.4	2078 33.8	+1.15
	L +1	60 1.0	529 8.6	433 7.0	49 0.8	10 0.2	1081 17.6	+0.54
	R 0	16 0.3	34 0.6	136 2.2	21 0.3	7 0.1	214 3.5	+0.14
	T —1	36 0.6	238 3.9	546 8.9	198 3.2	19 0.3	1037 16.9	+0.07
	M —2	63 1.0	276 4.5	550 9.0	476 7.7	368 6.0	1733 28.2	—0.47
N		982 16.0	1959 31.9	1979 32.2	793 12.9	430 7.0	6143 100.0	
Av.		+1.54	+0.77	—0.30	—1.26	—1.61		

Table 19 shows the relation between the feelings during the original incident and the feelings that were present on recalling the incident, irrespective of how long ago the incident occurred and irrespective of how frequently it had been re-

called. The number and per cent of incidents receiving the different grades during the original incident and on recalling it are as follows:

Feelings	*During Original Incident*	*On Recalling Incident*
Quite Pleasant	2,078 (33.8%)	982 (16.0%)
Slightly Pleasant	1,081 (17.6%)	1,959 (31.9%)
Indifferent	214 (3.5%)	1,979 (32.2%)
Slightly Unpleasant	1,037 (16.9%)	793 (12.9%)
Quite Unpleasant	1,733 (28.2%)	430 (7.0%)

The per cent of Quite P incidents changed from 33.8 during the original incident to 16.0 on recalling the incident, the per cent of Slightly P incidents changed from 17.6 to 31.9, the per cent of I changed from 3.5 to 32.2, the Slightly U from 16.9 to 12.9, and the Quite U from 28.2 to 7.0. During the original incident the feelings were P in 51.4% of the cases and U in 45.1% of the cases, and on recalling the incident the feelings were P in 47.9% of the cases and U in 19.9% of the cases. There is a marked tendency for the feelings which are present on recalling incidents to fade and become weaker with the passage of time, and this tendency is more marked in the case of incidents that were U, than in the case of incidents that were P, when they originally occurred. Those incidents that were +2 when they originally occurred averaged +1.15 when they were recalled, those that were +1 originally averaged +0.54 when they were recalled, those that were 0 originally averaged +0.14 in recall, those that were —1 originally averaged +0.07 in recall, and those that were —2 originally averaged —0.47 on being recalled. The total per cents of incidents remaining P or U, or changing from U to P or from P to U are as follows:

	Total Per Cent
Remaining P.....	37.1
Remaining U.....	17.2
Changing from U to P.....	10.0
Changing from P to U.....	2.2

TABLE 20

Relation Between Feelings During Original Incident and Recency or Remoteness of Incident: Combined Results
(74 Subjects and 6143 Incidents)

Feelings During Original Incident		*Recency or Remoteness of Incident* (1 = *Most Recent*)								*N*	*Av.*
		1	2	3	4	5	6	7	8		
	W	60	66	169	261	648	374	379	121	2078	5.22
	+2	1.0%	1.1	2.8	4.2	10.5	6.1	6.2	2.0	33.8	
	L	49	52	89	156	334	145	219	37	1081	5.01
	+1	0.8	0.8	1.4	2.5	5.4	2.4	3.6	0.6	17.6	
	R	8	10	25	31	51	30	52	7	214	5.06
	0	0.1	0.2	0.4	0.5	0.8	0.5	0.8	0.1	3.5	
	T	35	63	106	150	285	164	193	41	1037	4.98
	—1	0.6	1.0	1.7	2.4	4.6	2.7	3.1	0.7	16.9	
	M	43	63	139	171	478	290	426	123	1733	5.40
	—2	0.7	1.0	2.3	2.8	7.8	4.7	6.9	2.0	28.2	
N		195	254	528	769	1796	1003	1269	329	6143	
		3.2	4.1	8.6	12.5	29.2	16.3	20.7	5.4	100.0	
Av.		+0.25	—0.02	+0.08	+0.24	+0.22	+0.15	—0.05	—0.02		

Table 20 shows the relation between the feelings during the original incident and the recency or remoteness of the incident. The incidents that were +2 or —2 when they originally occurred were on the average recalled from more remote periods than the incidents that were +1, 0, or —1 when they originally occurred. The incidents that were —2 when they originally occurred were on the average recalled from more remote periods than the incidents that were +2 when they originally occurred. The differences between the average remoteness scores of incidents that were +1, 0, and —1 when they originally occurred (5.01, 5.06, and 4.98) are not reliable. When the recency or remoteness of the incident was between one month and 10 years (remoteness scores "3" to "6" inclusive), the feelings during the original incident were more P than U. The average feeling-scores were highest when the recency or remoteness of the incident was between 6 months and 5 years (remoteness scores "4" and "5"). When the recency or remoteness of the incident was less than one month (scores "1" or "2") or more than 10 years (scores "7" or "8"), it seems that the feelings during the original incident tended to be slightly more U than P.

TABLE 21

Relation Between Feelings During Original Incident and Frequency of Recalling Incident: Combined Results (74 Subjects and 6143 Incidents)

Feelings During Original Incident		*Frequency of Recalling Incident (3=Most Frequent)*			*N*	*Av.*
		A(3)	*B(2)*	*C(1)*		
	W	346	978	754	2078	1.80
	+2	5.6%	15.9	12.3	33.8	
	L	119	449	513	1081	1.64
	+1	1.9	7.3	8.4	17.6	
	R	29	69	116	214	1.59
	0	0.5	1.1	1.9	3.5	
	T	128	378	531	1037	1.61
	—1	2.1	6.2	8.6	16.9	
	M	267	661	805	1733	1.69
	—2	4.3	10.8	13.1	28.2	
N		889	2535	2719	6143	
		14.5	41.3	44.3	100.0	
Av.		+0.17	+0.28	—0.04		

Table 21 shows the results on the relation between the feelings during the original incident and the frequency of recalling the incident. The incidents that were +2 or —2 when they originally occurred had on the average been recalled more frequently than the incidents that were +1, 0, or —1 when they originally occurred. The incidents that were +2 when they originally occurred had on the average been recalled more frequently than the incidents that were —2 when they originally occurred. The differences between the average frequency scores of incidents that were +1, 0, and —1 when they originally occurred (1.64, 1.59, and 1.61) are not reliable. The average feeling-score of the incidents when they originally occurred is highest for those incidents that had been recalled from once a month to once a year (score of "B"), the average feeling-score of the incidents when they originally occurred is second in order for those incidents that had been recalled more frequently than once a month (score of "A"), and the average feeling-score of the incidents when they originally occurred is lowest for those incidents that had been recalled less frequently than once a year (score of "C").

Table 22 shows the relation between the feelings that were present on recalling the incident and the recency or remoteness of the incident. The incidents that were +2 or —2 when they were recalled were on the average recalled from less remote periods than the incidents that were +1 or —1 when they were recalled. The incidents that were +1 or —1 when they were recalled were on the average recalled from less remote periods than the incidents that were 0 when they were recalled. The incidents that were +1 when they were recalled were on the average recalled from more remote periods than the incidents that were —1 when they were recalled. The average feeling-scores of the incidents when they were recalled is approximately the same for the different groups of incidents arranged according to recency or remoteness. The 8 average feeling-scores range from +0.20 to +0.42, and the differences between these average scores are not reliable.

TABLE 22

Relation Between Feelings on Recalling Incident and Recency or Remoteness of Incident: Combined Results
(74 Subjects and 6143 Incidents)

Feelings on Recalling Incident		*Recency or Remoteness of Incident (1=Most Recent)*								*N*	*Av.*
		1	2	3	4	5	6	7	8		
	W	43	38	104	147	315	156	143	36	982	4.91
	+2	0.7%	0.6	1.7	2.4	5.1	2.5	2.3	0.6	16.0	
	L	61	72	138	230	595	332	402	129	1959	5.28
	+1	1.0	1.2	2.2	3.7	9.7	5.4	6.5	2.1	31.9	
	R	45	70	156	231	535	342	492	108	1979	5.36
	0	0.7	1.1	2.5	3.8	8.7	5.6	8.0	1.8	32.2	
	T	19	52	84	109	224	115	147	43	793	5.04
	—1	0.3	0.8	1.4	1.8	3.6	1.9	2.4	0.7	12.9	
	M	27	22	46	52	127	58	85	13	430	4.88
	—2	0.4	0.4	0.7	0.8	2.1	0.9	1.4	0.2	7.0	
N		195	254	528	769	1796	1003	1269	329	6143	
		3.2	4.1	8.6	12.5	29.2	16.3	20.7	5.4	100.0	
Av.		+0.38	+0.20	+0.32	+0.40	+0.42	+0.41	+0.29	+0.40		

TABLE 23

Relation Between Feelings on Recalling Incident and Frequency of Recalling Incident: Combined Results (74 Subjects and 6143 Incidents)

Feelings on Recalling Incident		*Frequency of Recalling Incident (3=Most Frequent)*			*N*	*Av.*
		A(3)	*B(2)*	*C(1)*		
	W	271	495	216	982	2.06
	+2	4.4%	8.1	3.5	16.0	
	L	203	950	806	1959	1.69
	+1	3.3	15.5	13.1	31.9	
	R	151	586	1242	1979	1.45
	0	2.5	9.5	20.2	32.2	
	T	127	327	339	793	1.73
	—1	2.1	5.3	5.5	12.9	
	M	137	177	116	430	2.05
	—2	2.2	2.9	1.9	7.0	
N		889	2535	2719	6143	
		14.5	41.3	44.3	100.0	
Av.		+0.39	+0.50	+0.25		

Table 23 shows the relation between the feelings on recalling the incident and the frequency of recalling the incident. The incidents that were +2 or —2 when they were recalled had on the average been recalled much more frequently than the incidents that were +1 or —1 when they were recalled. The incidents that were +1 or —1 when they were recalled had on the average been recalled much more frequently than the incidents that were 0 when they were recalled. The average feeling-score of the incidents when they were recalled was highest for those incidents that had been recalled from once a month to once a year (score of "B"), the average feeling-score was second in order for those incidents that had been recalled more frequently than once a month (score of "A"), and the average feeling-score was lowest for those incidents that had been recalled less frequently than once a year (score of "C").

Table 24 shows the relation between the recency or remoteness of the incident and the frequency of recalling the incident. The incidents in the most recent groups had been recalled most frequently, and the incidents in the most remote groups had been recalled least frequently. For the three groups of incidents arranged in descending order of the frequency with which they had been recalled, the remoteness scores were 3.24 (less remote), 5.07, and 5.93 (more remote).

TABLE 24

Relation Between Recency or Remoteness of Incident and Frequency of Recalling Incident: Combined Results (74 Subjects and 6143 Incidents)

		Frequency of Recalling Incident (3=Most Frequent)			*N*	*Av.*
		A(3)	*B(2)*	*C(1)*		
Recency or Remoteness of Incident (1=Most Recent)	1	160 2.6%	17 0.3	18 0.3	195 3.2	2.73
	2	167 2.7	57 0.9	30 0.5	254 4.1	2.15
	3	220 3.6	232 3.8	76 1.2	528 8.6	2.27
	4	124 2.0	465 7.6	180 2.9	769 12.5	1.93
	5	123 2.0	955 15.5	718 11.7	1796 29.2	1.67
	6	54 0.9	360 5.9	589 9.6	1003 16.3	1.47
	7	34 0.6	355 5.8	880 14.3	1269 20.7	1.33
	8	7 0.1	94 1.5	228 3.7	329 5.4	1.33
N		889 14.5	2535 41.3	2719 44.3	6143 100.0	
Av.		3.24	5.07	5.93		

Section 8.

EXPERIMENTAL. V. THE OPTIMISTIC TENDENCY IN JUDGING FEELINGS

Two group experiments were carried out in order to obtain further data on the optimistic tendency in judging feelings which we had previously observed in a study of "General Curves and Conditions of Feeling" **(21)**.

In the first experiment, the members of the writer's class in Abnormal Psychology at the University of Wisconsin were asked to grade their most customary and representative feelings during the day according to the following scale:

M....The best anyone can feel
T....
K....Average feelings of the class
H....
L....The worst anyone can feel

On this scale, *K* represented the theoretical or assumed average feelings of the Abnormal Psychology class as a whole. The concept of this average value was somewhat indefinite, but it was no more indefinite than the reference point or basis of judgment used in several of the studies described in Sections 2 and 3. *M* stood for the best anyone can feel, and *L* the worst anyone can feel, as far as the *S*'s were acquainted with these extreme conditions. *T* was located half way between *M* and *K*, and *H* half way between *K* and *L*.

The letter-grades of the scale were later changed into the following numerical grades in order to make certain quantitative calculations:

M....	+2.0
T....	+1.0
K....	0.0
H....	—1.0
L....	—2.0

The average scores for the sex and age groups are shown in Table 25. The theoretical or assumed average of all of the *S*'s should be 0.0, but of the 10 average scores for the different groups, 9 are above 0.0, and only 1 is below 0.0. If the scores for the 10 groups are weighted equally, the average score of all of the 192 *S*'s is +0.4, which is 10% of the distance from —2.0 to +2.0.

TABLE 25

Average Feeling-Scores

Age	*Sex*	*N*	*Av. Score*
19 and below	M	19	+0.1
	F	39	+0.3
20	M	24	+0.3
	F	24	+0.2
21	M	21	—0.2
	F	20	+0.5
22	M	17	+0.6
	F	8	+0.9
23 and above	M	16	+0.4
	F	4	+1.0

These results give an approximate indication of the extent to which the optimistic tendency in judging feelings influences the scores under the conditions of this experiment. It is quite probable that the disparity between the true and the obtained average feeling-scores would be greater if the *S*'s were placed in a personal face-to-face situation with *E* while the judgments of the feelings were being made.

In the second experiment, the members of the writer's class in General Psychology were asked to give the information requested on the following form.

(PLEASE WRITE NOTHING UNTIL THE EXPERIMENT BEGINS)

PART I.

Name (optional) ..... Course .....
Sex ..... (write M or F) Age ..... (years) Class .....

PART II.

Think over the unpleasant and pleasant experiences that you have had during the past month. Consider the number of each kind, their relative duration, and their relative strength. Write down brief titles for ten of these experiences, incidents, or events which were representative and typical of your life during the past month:

....
....
....
....
....

PART III.

Number of Your Unpleasant Activities .....
Number of Your Pleasant Activities .....
Duration of Your Unpleasant Activities .....
Duration of Your Pleasant Activities .....
Strength of Your Unpleasant Activities .....
Strength of Your Pleasant Activities .....

Scale for Grading Feelings

PART IV.

B ....More Than 50% Above the Average
M ....50% Above the Average
S ....40% Above the Average
G ....30% Above the Average
L ....20% Above the Average
V ....10% Above the Average
R ....Average of the Present Group
N ....10% Below the Average
W....20% Below the Average
K ....30% Below the Average
T ....40% Below the Average
Q ....50% Below the Average
P ....More Than 50% Below the Average

The conditions of the experiment were arranged so that they would favor the U activities as much as possible. The mimeographed forms were distributed and the experiment was begun near the end of a regular lecture period, and the students were kept seated for 4 minutes after the bell to dismiss the class had rung. In the printed and in the oral directions, the word "Unpleasant" was mentioned each time before the word "Pleasant." The *S*'s first filled out Part I., and then Part II. The object of Part II. was to have the *S*'s think concretely for a few moments about their P and U experiences, but no use was made of the titles of the incidents which they recorded. The *S*'s then gave the 6 grades required in Part III., and they used the scale included in Part IV. in assigning these grades. The letter-grades were used in order to avoid the possible suggestive influence of "plus" and "minus."

The letter-grades of the scale were later changed into the following numerical grades in order to make certain quantitative calculations:

B	+6.0
M	+5.0
S	+4.0
G	+3.0
L	+2.0
V	+1.0
R	0.0
N	—1.0
W	—2.0
K	—3.0
T	—4.0
Q	—5.0
P	—6.0

The average number, duration, and strength of P and U activities for the sex and age groups are shown in Tables 26, 27, and 28 respectively. The theoretical or assumed average

TABLE 26

Average Number of P and U Activities

Age	*Sex*	*Pleasant*		*Unpleasant*	
		N	*Av. Score*	*N*	*Av. Score*
19 and below	M	34	+1.9	36	+0.1
	F	50	+2.0	50	0.0
20	M	42	+1.3	42	+0.3
	F	38	+2.2	38	+0.1
21	M	32	+1.2	32	+0.2
	F	14	+2.8	14	+1.0
22 and above	M	35	+1.5	35	+0.7
	F	22	+1.8	22	+0.8

TABLE 27

Average Duration of P and U Activities

Age	*Sex*	*Pleasant*		*Unpleasant*	
		N	*Av. Score*	*N*	*Av. Score*
19 and below	M	33	+1.4	35	−0.3
	F	49	+1.6	49	+0.6
20	M	41	+1.3	41	+0.5
	F	38	+1.4	38	+0.7
21	M	32	+1.0	32	+1.6
	F	14	+1.9	14	+0.6
22 and above	M	36	+1.5	36	+0.9
	F	22	+1.4	22	+0.9

TABLE 28

Average Strength of P and U Activities

Age	*Sex*	*Pleasant*		*Unpleasant*	
		N	*Av. Score*	*N*	*Av. Score*
19 and below	M	34	+2.1	34	+0.9
	F	48	+1.8	48	+0.6
20	M	42	+1.6	42	+1.4
	F	37	+1.6	37	+1.6
21	M	30	+1.5	31	+0.5
	F	14	+2.6	14	+1.1
22 and above	M	36	+1.3	36	+0.7
	F	21	+1.6	21	+0.8

scores should be 0.0 for each of the following 6 groups; number of P activities, number of U activities, duration of P, duration of U, strength of P, and strength of U; but practically all of the average scores for both the P and the U activities are above 0.0. In Table 26 all of the 16 average scores are positive except one, which is 0.0. In Table 27 all of the 16 average scores are positive except one, which is —0.3; and in Table 28 all of the 16 scores are positive. Out of 24 pairs of average P and average U scores in the 3 tables, the P score is higher than the U score in 22 cases. If the sex and age groups are weighted equally, the following combined average results are obtained:

	Number	*Duration*	*Strength*
Pleasant	+1.8	+1.4	+1.8
Unpleasant	+0.4	+0.7	+1.0

These results show quite clearly that in spite of the fact that the external conditions of the experiment were so arranged that they would favor the U activities, the optimistic tendencies of the *S*'s had enough influence on the scores to offset this advantage and to cause the P scores to be above the U scores in 22 cases out of 24. There was a tendency to exaggerate the number, duration, and strength of both the P and the U scores; but a greater tendency to exaggerate the number, duration, and strength of the P scores. In the experiments described in other sections of the present paper, the *absolute* number, duration, and strength of the P and U activities are not as important as the *relative* number, duration, and strength of the P and U activities. The optimistic tendency which seems to be demonstrated by the two experiments described in the present section is apparently present at practically all times and under almost all experimental conditions.

Section 9.

GENERAL CONCLUSIONS AND PROPOSITIONS

The experimental results presented in Sections 4, 5, 6, 7, and 8, and the earlier investigations summarized in Sections 2 and 3, present a fairly complicated picture, and drawing conclusions from these data is not without its difficulties. A great variety of methods and materials has been used, and some of the experiments have been much more concerned with lifelike situations than others. Most of the previous writers have failed to distinguish between the feelings that were present during the original experience and the feelings that were present while the experience was being recalled. In the large majority of the investigations the experimental situation included several disturbing factors of unknown quantity. Some authors have displayed what seemed to be an emotional bias against psychoanalysis, and the principal object of their experiments was to demonstrate that the pleasure-pain principle or the Freudian doctrine of repression was wrong. In attempting to explain their somewhat surprising results, other investigators have erroneously assumed that the P and U activities of everyday life are equal in number, or they have made the equally gratuitous assumption, generally arrived at *a priori*, that under the ordinary conditions of everyday life the P activities are more numerous and of longer duration than the U activities. An even more unfortunate mistake has been that of not considering the optimistic tendency in judging feelings.

In spite of these limitations, however, a considerable body of data is now available, and an attempt will be made on the following pages to state the most important general conclusions which seem justified. Although a sanguine attempt of this kind is not without its dangers, the bold conclusions have the merit of providing a clearer and more complete statement of the various problems, and they should afford a more concrete and adequate basis for further research. Some of the speculative statements which are not strongly supported by experimental evidence are referred to as "propositions," and all of the experimental investigations which support or oppose each conclusion or proposition are listed in chronological or-

der. All of the following conclusions and propositions seem to be justified by the experimental and observational data, but we have made a special effort to cite all evidence which opposes or contradicts them.

1. *There Is an Optimism of Judgment and an Optimism of Memory for Affective Activities.*—Whenever a judgment of P and U activities which exist at the present time or which have existed in the past is required, there is a general tendency to overestimate the number, duration, and strength of the P activities and to underestimate the number, duration, and strength of the U activities. Optimism is a socially approved attitude to which all people are in some measure susceptible.

Some direct evidence in favor of the above *conclusion* is furnished by Gordon (**45**), Offner (**74**), Peters (**79, 80**), Cason (**21**), and Experiment V. in Section 8 of the present paper. With a certain amount of interpretation of their results, this conclusion is also supported by Kowalewski (**58**), Morgan (**70**), Wohlgemuth (**125**), Washburn (**119**), Flügel (**37**), Thomson (**111**), and Experiments I. and IV. in the present paper. The conclusion is supported in a general way by a number of investigations which show the influence of attitudes, sympathies, and antipathies on testimony.[1] Further arguments in behalf of Conclusion 1 and Propositions 3 and 8 have been expounded by various pessimistic writers.[2]

It would be more pleasing to say that people on the whole feel better than they realize, partly because the attitude of optimism and the habit of rationalization are necessary to many if they are to maintain their general equilibrium. In the large majority of the population, however, there is a constant and more or less unsuccessful striving to relieve an unpleasant strain and tension. The assumption that everybody is happy and in good spirits 95% of the time appears strange when one considers the frequency with which various intelligent writers have had occasion to describe or allude to the melancholy condition of humanity. The general habit of optimism and rationalization is deliberately acquired by almost all people after a certain amount of difficult training, and it influences the direction of the results in all kinds of studies of the present subject.

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[1] For example, see Zillig, 128.

[2] Cf. Burton, 17, Schopenhauer, 99, 98, Horwicz, 54, Nietzsche, 73, and Hartmann, 49.

2. *P Activities Are Positively Correlated with Optimistic Temperaments, and U Activities Are Positively Correlated with Pessimistic Temperaments.*—The correlations are positive in each of the following cases: (A) between readiness in experiencing and recalling P rather than U activities, and an optimistic temperament; (B) between readiness in experiencing and recalling U rather than P activities, and a pessimistic temperament; (C) between overestimating the number, duration, and strength of the P activities, and an optimistic temperament; and (D) between a decrease in the tendency to overestimate the number, duration, and strength of the P activities and a decrease in the tendency to underestimate the number, duration, and strength of the U activities, and a pessimistic temperament.

The above *conclusion* is opposed by the results of Thomson (**111**); and some slight evidence in its favor is furnished by the experiments of Baxter (**10**), Morgan (**70**), and Laird (**62**).

There are large individual differences between different individuals and in the same individual at different times in the tendency to optimism and in the readiness in experiencing and recalling P and U activities. The relative number of P and U experiences that the same person tends to recall at different times depends partly upon his mood and upon whether he is exalted or depressed. In discussing the question of whether pains can be more easily remembered than pleasures, Ribot (**91**, 169) remarked that "Optimists and pessimists have fought fiercely over this phantasmal problem; but it is a vain and factitious question so long as we suppose that it admits of but one solution. There is not, and cannot be, a general answer. Certain individuals revive joyful images with astonishing facility; sad memories, when they arise, are immediately and easily trodden down. I know an inveterate optimist, successful in all his undertakings, who has much difficulty in picturing to himself the few reverses that he has experienced. 'I remember joys much more easily than painful states' is an answer I frequently meet with in my notes. On the other hand, there are many who say 'I remember sorrows much more easily than pleasurable states.' In the course of my inquiries I have found that the latter are the most numerous."[3]

[3] The question of affective memory will be considered in connection with conclusion 15. A discussion of the correlation between optimistic and pessimistic temperaments, on the one hand, and sensibility to and retention of pleasure and pain, on the other, may be found in Sully, 109, 398-463.

3. *U Activities and Experiences Are Stronger and Have a More Positive Character than P Activities and Experiences.*—U activities are stronger and more insistent, they are more basic and central in the organization of the personality, and they play a more important role in motivating conduct.

Some experimental and observational evidence in favor of this *proposition* has been given by Peters (**79, 80**), and Cason (**20**). The general historical background of this proposition may be found in the following references given at the end of the present paper: **86, 87, 99, 95, 11, 49, 66, 91, 94, 22,** and **77.**

P and U activities differ from each other qualitatively and quantitatively in several important respects, and the alleged opposition between them is incomplete at several points. The kind of use that is made of pain in medical diagnosis is qualitatively and quantitatively different from any use that can be made of pleasures on any occasion. U activities appear earlier in the development of the individual, and most of the characteristic expressive movements in men and animals are related to the U feelings and emotions. Practically all of the experimental work on the physiological activities involved in feelings and emotions has been concerned with U feelings and emotions. It appears that the P and U activities and experiences are not located on exactly the same psychological plane.

4. *There is Further Learning and a Later Relative Improvement in the Retention and Reproduction of P Activities.*—Although it is ordinarily possible to reproduce U activities and experiences of the past if the effort is made, there is a natural tendency to avoid recalling and thinking about them, and people generally do not recall or think about them as frequently as the P activities. The processes involved in recalling and thinking about former P activities, experiences, feelings, and emotions constitute further learning, and this additional learning makes their later retention and reproduction more efficient than they would otherwise have been in comparison with the retention and reproduction of equally remote U activities. This additional learning of the P activities and this later relative increase in the efficiency of retaining and reproducing them in comparison with the U activities are partly responsible for the belief that the number, duration, and

strength of the P activities of the past have been greater than they actually were. As a result of these factors, and because of the tendency to try to avoid thinking about the U activities, there is an illusion—both in the minds of those who have been the subjects of various investigations and in the minds of those who have collected the data, discussed the results, and drawn the conclusions—in regard to the relative number, duration, and strength of the P activities of the past, in comparison with the number, duration, and strength of the U activities of the past.

The above *conclusion* is opposed by the experiments of Kowalewski (**59**), and Wohlgemuth (**125**) ; and it is supported by the experiments described in references **79**, **80**, **70**, **118**, **62**, **119**, **69**, **111**, **57**, and Experiments I., II. and III., and IV. With a certain amount of interpretation of the results, it is also supported by **25**, **58**, **50**, **10**, **47**, **39**, and **37**.

Although there is a positive reaction tendency for P activities and a negative reaction tendency for U activities, there are some important exceptions, and the conclusion stated above does not hold for every affective activity or experience of every individual. There is a closer correspondence between these positive and negative reaction tendencies and the more "physical" pleasures and pains than between the positive and negative reaction tendencies and the less "physical" P and U experiences. The above conclusion also seems to be more applicable to lifelike situations and activities than to situations which involve restricted laboratory material and activities.

5. *There Is Little, if Any, Difference in the Efficiency With Which P and U Activities Can Be Learned.*—If the external and internal conditions of the *S* are equally favorable for the P and U activities, there is little, if any, difference in the efficiency with which these activities can be learned. As far as the P and U activities and experiences themselves are concerned, that is, in and of themselves, the U activities can be learned with approximately the same efficiency as the P activities. With equally favorable conditions also, a dislike can be learned as readily as a like, an annoyance as easily as a pleasure, and a fear or hate as efficiently as a so-called "joy." The external and internal conditions of the *S*'s, however, are generally not equally favorable for the P and U activities. The natural preference for the P activities, the habit of neglecting

and trying to avoid the U activities, and the factors of desire, interest, and effort, all favor a relative increase in the efficiency of learning the P activities and a relative decrease in the efficiency of learning the U activities.

The above *conclusion* is opposed by Tait (**110**); and it is supported, in some cases with a certain amount of interpretation, by **45**, **12**, **106**, **46**, **5**, **23**, **19**, and Experiments II. and III.

In practically all of the investigations of this subject, measures were obtained of the efficiency of learning (or almost immediate retention) for P activities and for U activities, and the averages of these two groups of measures were then compared. The overlapping between the two groups of measures is much more significant than the slight differences between the averages, and even with the internal and external conditions of the learning more favorable for the P activities, the differences between the averages are generally not reliable. The large amount of overlapping in the results and the unreliable differences between the averages seem to be sufficient justification for the conclusion stated above.

Many of the earlier discussions of this question were concerned with the influence of feeling on association, and the assumption was sometimes made that feeling and association are two separate faculties of the mind. These earlier writers believed that what is associated is not a feeling, and that what is felt is not an association. The association was of course acquired, and the feeling was inherited, and the belief still persists in some quarters that the differential factors influencing the development of affective processes are entirely native. In recent years, however, an internal revolution has caused a definite shrinkage in the field of technical genetics, and valuable studies in genetic psychology have produced a further modification of opinion, so that the field of learning has greatly broadened at the expense of heredity. When it was assumed that all feelings and emotions were native, the only question to discuss was the influence of the affective processes on learning. But at the present time we also have the important question of the relative efficiency of learning the P and U feelings and emotions themselves. This particular problem will be considered in connection with Conclusion 15. For the time being we are concerned with the more inclusive question of the efficiency of learning activities that are P as compared with the efficiency of learning activities that are U.

According to some of the exaggerated statements of the "law" of effect, a P activity is "stamped in" and fixed, but a U activity is "stamped out" and is not learned. Those who have supported this law have not always realized the fact that not only can P activities be learned, but that U and I activities can also be learned, and the U and I activities and the U and I feelings and emotions are often learned in a most efficient manner. In some of the animal experiments that have been used so freely as illustrations, the animal could make only one "right" response; but there are innumerable situations in everyday life which do not bear even a faint resemblance to a kitten escaping from a box, *e.g.*, conditioned response learning, redintegrative learning, serial rote learning, memory span learning, and the ordinary learning which occurs when one is reading printed material or listening to another person talk. One frequently learns activities that involve all kinds of feelings from extremely P to extremely U, and also activities that are not markedly P or markedly U. The pleasure-pain theory of learning was originated by Spencer, Bain, and Baldwin, and their discussions were more carefully guarded and less sensational than some of the later treatments. The law of effect has been criticized by Watson (**121**), Holmes (**53**), Peterson (**81**), Snoddy (**103**), Crosland (**27**), Cason (**18**), and others. We shall elsewhere discuss the question of whether the after-effects of P and U experiences can have a retroactive influence on activities that have already occurred and which no longer exist.

6. *There Is Little, if Any, Difference in the Efficiency With Which Activities That Were P and U When They Originally Occurred Can Be Retained and Reproduced.*—If the external and internal conditions of the *S* are equally favorable for activities that were P and U when they originally occurred, there is little, if any, difference in the efficiency with which these activities can be retained and reproduced. As far as the P and U activities and experiences themselves are concerned, that is, in and of themselves, activities that were originally U can be retained and reproduced with approximately the same efficiency as activities that were originally P. With equally favorable conditions also, a dislike can be retained and reproduced as readily as a like, an annoyance as easily as a pleasure, and a fear or hate as efficiently as a so-called "joy." The ex-

ternal and internal conditions of the *S*'s however, are generally not equally favorable for activities that were originally P and U. The natural preference for the P activities, the habit of neglecting and trying to avoid the U activities, the factors of desire, interest, and effort, and the factor of later learning, all favor a relative increase in the efficiency of retaining and reproducing activities that were P when they originally occurred and a relative decrease in the efficiency of retaining and reproducing activities that were U when they originally occurred.

This *conclusion* is opposed by Tait (**110**), Tolman (**115**), Laird (**62**), and Thomson (**111**); and it is supported, in some cases with a certain amount of interpretation, by **25**, **58**, **45**, **59**, **50**, **13**, **79**, **80**, **72**, **10**, **70**, **47**, **12**, **118**, **125**, **119**, **106**, **46**, **5**, **23**, **19**, **69**, **57**, and Experiments I., II. and III., and IV.

The most significant fact about retention and reproduction is that most of the activities and experiences that have been learned are permanently forgotten; although the total number of details that one retains is always much greater than the total number that he can reproduce. Perhaps something like 90 per cent of all of the facts learned, objects seen, details thought of in reading and in conversation, names acquired, and feelings and emotions experienced are, for all practical purposes, permanently forgotten. The average person cannot afford an elaborate psychoanalytic treatment every time he has some difficulty in recalling a past experience. The most important general aspect of retaining and forgetting is not the obliviscence of unbearable ideas and painful memories, but the disappearance with the passage of time of all kinds of activities and experiences, not only those that were U but also those that were P and I when they originally occurred.[4] It would be as gross an exaggeration to claim that all activities that were originally U are forgotten as it would be to assert that all activities that were originally P are retained and reproduced. The large majority of our learned activities are not forgotten because they were originally P, U, or I; but because there is a general tendency for all kinds of learned activities and experiences to be forgotten; and also because some of our experiences have no special significance for us, they do not interest us particularly,[5] and we do not

[4] Cf. Hollingworth, 52.
[5] See Renda, 89.

happen to think of them frequently on later occasions; so that the further learning and the later improvement in retention and reproduction referred to above do not occur. Although some activities are remembered from remote periods, the later retention and reproduction are frequently not the result of the original learning alone, but partly the result of the later learning and the later improvement in the efficiency of retention and reproduction.

U activities and experiences are more basic and central in the organization of the personality than the P activities, and the U activities are decidedly more important in mental disorders. It is often of some value for a mental patient to recall certain early emotional experiences which may have had something to do with his trouble, and the psychoanalysts have frequently been attracted to the unusual difficulty experienced in helping the patient to recall some of these U experiences.[6] Although there may be some difficulty in consciously recalling these experiences, the psychoanalysts have shown by a multitude of examples that the activities or tendencies in question are still retained and that they continue to influence behavior. A patient suffering from hysteria or compulsion neurosis always forgets some of his P experiences along with some of his U experiences, but any difficulty in recalling P experiences does not attract much attention because recalling them is not an equally important aid in regaining mental health. Sometimes practically all of a psychoneurotic's experiences have been U, and the question of how efficiently P experiences can be recalled in comparison with the U experiences is not even raised because the patient has had few, if any, P experiences to recall.

Some of the psychoanalysts claim that the censor tends to inhibit what is U to the ego; and that personally painful material is suppressed between the conscious and the foreconscious or repressed between the foreconscious and the unconscious. This view is in harmony with the pleasure-pain principle. The claim is also made that when there is special difficulty in recalling a name or some other matter, that the detail in question is often found to be associated with an unpleasant memory.[7] Jones (**56**) states that "It is more diffi-

[6] Cf. Brown, 15.

[7] Freud, 40, 41, Pear, 77, and Jones, 56. For an exhaustive list of references, see Rickman, 96.

cult to recall an unpleasant memory than a pleasant one, other things being equal," and he goes farther even than some of the other psychoanalysts in claiming that "All forgetting is due, in part at least, to repression."[8] The psychoanalysts, however, have not always stressed the fact that suppression or repression is not the same as forgetting, and that memory and conscious recall are not the same as retention and reproduction. When the material leaves the foreconscious and takes up its abode in the unconscious, it cannot for the moment be consciously recalled, but it is still retained, and it continues to influence behavior. The U material has therefore not been forgotten. Activities may be retained and reproduced even though they cannot be consciously recalled.

Numerous clinical observations are available which show beyond reasonable doubt that U experiences can be suppressed and repressed in a most unusual manner. Diller (**30**) states that murderers frequently have a loss of memory for the actual killing, although they may remember events which transpired just before or just after the act. However, in a number of dissociated conditions, such as dreams, somnambulisms, fugues, and hypnotic states, the activities and experiences cannot be easily recalled, although they may not have been particularly U when they occurred. There can be a pronounced amnesia for P activities and experiences as well as for U activities and experiences. If the effort is made, and the method of free association is used, it is generally possible to recall some of the U as well as some of the P activities of the past.

The pleasures, likes, and joys of early life do not seem to be retained and reproduced with remarkable efficiency; and many of the acquired fears, annoyances, aversions, dislikes, hates, and sorrows are not characterized by rapid obliviscence. In the majority of cases a person is unable to consciously recall the original conditions or circumstances of acquiring fears, annoyances, and dislikes, partly because many of them were acquired at such an early age; but these experiences and activities continue to exert an influence on behavior, and both retention and reproduction are therefore present and active in a most important sense.

7. *The Relative Efficiency of Retaining and Reproducing Activities That Were P and U When They Originally Occurred*

[8] Wohlgemuth, 126, gives a lengthy discussion, of very unequal value, of these and other related matters.

Depends upon Whether the Factors of Desire, Interest, Effort, and Later Learning Have Been Present and Active.—(A) Before the factors of desire, interest, effort, and later learning have had an opportunity to operate, there is little, if any, difference in the efficiency of retaining and reproducing activities that were P and U when they originally occurred. (B) After the factors of desire, interest, effort, and later learning have been present and active, the efficiency of retaining and reproducing activities that were distinctly P when they originally occurred is on the average superior to the efficiency of retaining and reproducing activities that were distinctly U when they originally occurred.

Conclusion (A) is supported by Gordon (**45**, **46**), Anderson (**5**), and Chaney (**23**). *Conclusion* (B) is opposed by Wohlgemuth (**125**); and it is supported by **25**, **58**, **59**, **50**, **110**, **79**, **80**, **72**, **10**, **115**, **70**, **47**, **12**, **118**, **62**, **119**, **37**, **106**, **69**, **111**, **57**, and Experiments II. and III.

8. *Under the Ordinary Conditions of Everyday Life, the U Activities Are More Numerous and of Longer Average Duration Than the P Activities.*—The U activities, experiences, feelings, and emotions of everyday life are more numerous and of longer average duration than the P activities, experiences, feelings, and emotions.

This *proposition* is opposed by Flügel (**37**); and it seems to be supported by Cason (**19**, **20**). With a certain amount of interpretation of the results, it is also supported by Peters (**79**, **80**), and Experiment IV.

Although this is a question that cannot be readily decided by a direct experimental approach, it seems to be a fairly reasonable deduction from the experimental and observational data. If unselected *S*'s are asked about the number and duration of their P and U activities under the ordinary conditions of everyday life, they will generally say that the P activities are more numerous and of longer duration. According to Conclusion 1, an optimism of judgment and memory for affective activities is widespread in the population, and almost any group of *S*'s will overestimate the number, duration, and strength of their P activities and will underestimate the number, duration, and strength of their U activities. This optimistic attitude is also present when *S*'s are questioned in regard to their affective activities of the past. According to Conclusion 4, there is a further learning and a later relative improvement in

the retention and reproduction of P activities, as a result of the natural preference for the P activities and the tendency to neglect and try to avoid thinking about the U activities. If Conclusions 1 and 4 are accepted, and it seems that they should be, then the scores for the number and duration of the P activities are too high, and the scores for the number and duration of the U activities are too low. The obtained difference, P-U, is positive; but if the factors described in Conclusions 1 and 4 are present and active then it is possible that the true difference should be 0 or a negative quantity.

The argument that we have advanced in favor of the above proposition may be made clearer by the following illustration. Let us suppose that the prominence of the P activities is correctly represented by the number 35, and that the prominence of the U activities is correctly represented by the number 45. When a study is made of the relative prominence of P and U activities, the *S*'s give the P activities 10 points too much, raising the P score from 35 to 45, and they give the U activities 10 points too little, depressing the U score from 45 to 35. The *S*'s give scores of 45 for P and 35 for U, although the true scores are 35 for P and 45 for U.

In some of the experiments described in Section 3, school children were questioned about the relative prominence of their P and U experiences during a holiday; and it is clear that some of the other experimenters also made an optimistic selection of *S*'s. The feelings and emotions of school children are obviously not representative of the whole population, and the relative number and duration of the P and U experiences of children during a one-day holiday are certainly not typical of the relative number and duration of P and U experiences during all of the days of the year. The question may well be raised whether one can expect reliable results from these experiments when the experimental conditions were so obviously prejudiced in favor of the P activities.

9. *The Relative Number of Activities of Everyday Life That Were P and U When They Originally Occurred Which Can Be Reproduced Depends Upon Whether the Factors of Desire, Interest, Effort, and Later Learning Have Been Present and Active.*—(A) If the *S* makes a serious effort to reproduce activities and experiences of everyday life that were P and U when they originally occurred, and if the effort is made before the factors of desire, interest, effort, and later learning have had an op-

portunity to operate, he will generally be able to reproduce more U than P activities and experiences. In the case of the majority of individuals in the population, there have been more of the U activities and experiences to reproduce. (B) If the *S* attempts to reproduce activities and experiences of everyday life that were P and U when they originally occurred, and if the attempt is made after the factors of desire, interest, effort, and later learning have been present and active, he will generally be able to reproduce more P than U activities and experiences. Since the activities and experiences originally occurred, the *S* has thought about the P activities more than the equally remote U activities, and there has been a further learning and a later relative improvement in the efficiency of retention and reproduction of the P activities, in comparison with the U, so that more of the P than the U can now be reproduced.

With a certain amount of interpretation, some support for *Proposition* (A) is furnished by Peters (**79, 80**), Cason (**20, 21**), and Experiment V. *Conclusion* (B) is opposed by Kowalewski (**59**) ; and it is supported by **25, 58, 50, 79, 80, 70, 37, 111**, and Experiments I., and IV.

Since the factors described in connection with Conclusions 1 and 4 are practically always operating in lifelike situations and the external and internal conditions of the *S*'s are almost never equally favorable for the P and U activities, most of the results that could be obtained even under carefully controlled conditions would contradict Proposition (A).

10. *The Efficiency of Learning Is Greater When the Affective Factor Is Present.*—(A) Activities and experiences that are decidedly P or decidedly U can be learned more efficiently than activities and experiences that are I, or only mildly P or mildly U. (B) There is little, if any, difference in the efficiency of learning activities and experiences that are mildly P, mildly U, and I.

Conclusion (A) is supported by **110, 72, 12, 39, 127**, and **100**. *Conclusion* (B) is supported by **45, 5, 23**, and Experiments II. and III.

11. *The Efficiency of Retention and Reproduction Is Greater When the Affective Factor Was Present During the Original Learning.*—(A) Activities and experiences that were decidedly P or decidedly U when they were originally learned can be retained and reproduced more efficiently than equally re-

mote activities and experiences that were mildly P, mildly U, or I when they were originally learned. (B) There is little, if any, difference in the efficiency of retaining and reproducing equally remote activities and experiences that were mildly P, mildly U, and I when they were originally learned.

Conclusion (A) is supported by **110, 72, 115, 47, 12, 39, 127, 100, 57,** and Experiments I., and IV. Conclusion (B) is supported by **45, 13, 5, 23,** and Experiments I., II. and III. and IV.

12. *There Is Little, if Any, Difference in the Efficiency of Reproducing Activities and Experiences That Are P and U When They Are Reproduced.*—If the external and internal conditions of the *S* are equally favorable for activities and experiences that are P and U when they are reproduced, there is little, if any, difference in the efficiency with which they can be reproduced. As far as the P and U activities and experiences themselves are concerned, that is, in and of themselves, activities and experiences that are U when they are reproduced can be reproduced with approximately the same efficiency as activities and experiences that are P when they are reproduced. The external and internal conditions of the *S*'s, however, are generally not equally favorable for activities that are P and U when they are reproduced. The natural preference for the P activities, the habit of neglecting and trying to avoid the U activities, the factors of desire, interest, and effort, and the factor of later learning, all favor a relative increase in the efficiency of reproducing activities that are P when they are reproduced and a relative decrease in the efficiency of reproducing activities that are U when they are reproduced.

The above *conclusion* is opposed by Tait (**110**), and Laird (**62**) ; and it is supported, in some cases with a certain amount of interpretation, by **25, 58, 45, 13, 79, 80, 10, 115, 70, 12, 118, 125, 39, 119, 106, 46, 5, 127, 23, 19,** and Experiments I., II. and III. and IV.

13. *The Efficiency of Reproducing Past Activities and Experiences Is Greater When the Affective Factor Is Present on Reproducing These Activities and Experiences.*—(A) In reproducing or recalling past activities, experiences, feelings and emotions, the efficiency of reproducing activities and experiences that are decidedly P or decidedly U when they are reproduced is superior to the efficiency of reproducing equally

remote activities and experiences that are mildly P, mildly U, or I when they are reproduced. (B) In reproducing or recalling equally remote activities, experiences, feelings, and emotions, there is little, if any, difference in the efficiency of reproducing activities and experiences that are mildly P, mildly U, or I when they are reproduced.

Conclusion (A) is supported by **110**, **79**, **80**, **72**, **115**, **12**, **37**, **127**, **100**, and Experiments I., and IV. *Conclusion* (B) is supported by **45**, **13**, **5**, **23**, and Experiments I., and II. and III.

14. *The Feelings Which Are Present on Reproducing or Recalling Past Activities and Experiences Tend to Change With the Passage of Time.*—If activities, experiences, feelings, and emotions that were originally P or U are reproduced or recalled after various intervals of time, the feelings which are persent on recalling and thinking about these activities tend to approach a condition of indifference. The feelings which are present on reproducing or recalling activities, experiences, feelings, and emotions that were U when they originally occurred move closer to the condition of indifference, or reach this condition sooner, than the feelings which are present on recalling equally remote activities that were P when they originally occurred. The feelings remain P much more frequently than they remain U, and they shift from U to P much more frequently than they shift from P to U.

This *conclusion* is supported by **45**, **59**, **79**, **80**, **118**, **119**, **120**, **19**, and Experiments I., and IV.

Henderson (**50**) writes that "The memory of a disagreeable experience may be agreeable, disagreeable, or indifferent. Which effect we get depends very largely on the relation of the past experience to our present situation. If it constitutes a difficulty overcome, or one of trifling importance in relation to our subsequent history, we are apt to view it with pleasure or indifference. On the other hand, if the episode is one that had bad consequences, the effect of which is still in evidence, we may shudder to recall it." In this same connection, Virgil gives an account of how Aeneas tried to comfort his followers who were shipwrecked on the coast of Africa by telling them that at some future time they would find pleasure in describing their hardships.[9]

15. *Feelings and Emotions Are Pattern Activities, and They*

[9] Peillaube gives a good description of a case of affective revival in 78, 110-111.

Can Be Learned, Retained, and Reproduced.—(A) Feelings and emotions are pattern psychological activities, and they involve processes that are physical, chemical, physiological, neurological, endocrinological, visceral, sensory, muscular, verbal, mental, conscious, unconscious, etc. The causal factors operate in all directions between all of the different kinds of activities involved in the total pattern activity: the neurological processes influence the muscular, the mental influence the visceral, the endocrinological influence the verbal, etc. A feeling or an emotion is more than merely the visceral processes, or the physiological, or the sensory, or the muscular, or the conscious, etc. (B) The activities which are involved in various feelings and emotions are partly inherited and partly acquired, and the connections between the common stimuli and situations of everyday life and the affective responses are largely learned. All people can learn likes, dislikes, annoyances, aversions, hates, fears, and so on, in the same sense that they can learn a verbal response or learn a manual habit. All people can retain and reproduce some of the activities which were involved in their feelings and emotions when these feelings and emotions were originally learned. (C) The physiological and unconscious activities involved in the learned feelings and emotions are retained and reproduced more efficiently than the conscious activities involved in the feelings and emotions. All people can recall some of the conscious activities that were originally present in some of their learned feelings and emotions when these feelings and emotions were experienced; but there are large individual differences between different people in this matter of affective memory.

Proposition (A) is concerned with the nature and definition of feelings and emotions. There is a fairly general agreement that affective activities are not equal to the sum of the alleged elements which were once thought to constitute them. Even in chemistry, compounds are not equal to the elements involved in them, and there is less evidence for such an assumption in psychology. The definition which we have proposed takes account of the very obvious overlapping between the sciences of physiology, neurology, endocrinology, and psychology. Affective activities are activities of the organism, and they are inseparably connected with processes that are visceral, muscular, sensory, verbal, etc. It is just as unjustified to define feelings and emotions in terms of conscious ex-

periences alone as it is to think of feelings and emotions in terms of objective behavior alone. The definitions of affective processes which are current in crass behaviorism, crass mentalism, and the mysterious purposive psychology are all definitely limited in scope, and all of them interfere with needed research in several closely related fields.

Conclusion (B) is concerned with the extent to which the differential factors in the development of affective activities are inherited and acquired. Although the differential factors in the development of feelings and emotions are both native and environmental in an important sense, it is possible to make a rough determination of the relative influence of the two groups of factors. The evidence in favor of the complete inheritance of feelings and emotions is even weaker than the arguments advanced by James, McDougall, and Thorndike in support of the "instincts."[10] Some of the activities involved in the feelings and emotions are not only learned, retained, and reproduced, but some of them are commonly learned, retained, and reproduced more efficiently than the colder psychological processes such as skilled manual habits and cultivated language habits.

Conclusion (C) is concerned with affective memory, and it is closely related to the preceding conclusion which stated that "The feelings which are present on reproducing or recalling past activities and experiences tend to change with the passage of time." Only a small portion of one's former conscious affective experiences can be recalled, but one must not forget that only a small portion of one's former conscious visual and auditory experiences can be recalled, and only a small portion of one's former unconscious, physiological, muscular, or verbal activities can be reproduced. A comparison of some of the more objective studies of the learning, retention, and reproduction of feelings and emotions[11] with the more introspective investigations seems to show that the physiological and unconscious activities involved in the feelings and emotions can be retained and reproduced more efficiently than the conscious activities. But if it is admitted that even a small portion of the conscious activities which are present in the feelings and emotions are learned, retained, and reproduced, then the exist-

[10] Cf. Rignano, 97, Müller-Freienfels, 71.

[11] See, for example, Burnham, 16, Watson and Rayner, 122, Allport, 4, and Dashiell, 28.

ence of affective memory would be granted as a matter of course.

Some psychologists have assumed the existence of affective memory without stressing the matter, and others have considered that the evidence in its favor is so weak that the whole subject may well be ignored. McDougall, for example, makes the following remark in a footnote: "I leave aside the question. . . . Do we, in remembering an emotional incident, experience the same emotion over again or merely *remember the emotion?*[12] This question seems to be entirely unreal; as unreal as the question—When we *remember an object,*[13] is the idea that comes to consciousness the same idea that we had when we thought of it on former occasions?" (**15**, 24). It may be true, as Bergson and James have claimed, that conscious experiences are never the same on two successive occasions; but the same is also true to some extent of all physiological and psychological activities. This general weakness, which is especially characteristic of psychology, may be clearly illustrated by the following examples. If the *S* dislikes object A now, and learned to dislike A some years ago, the present disliking is psychologically not the same disliking as that which originally occurred, although logically the two dislikes may be assumed to be the same. A certain individual may have learned to hate B; and on different occasions when this response is aroused, the *hatings* are psychologically different hatings, although the *hates* are logically the same. If the successive reproductions of a learned response bear a reasonable resemblance to each other, it is customary to say that the same response is being reproduced. The conscious activities involved in the learned feelings and emotions are often recalled, but there has been considerable disagreement in regard to the means by which they are recalled. This disagreement may be illustrated by the following earlier opinions which have strongly influenced the trend of later discussions.

Spencer (**105**, 231) said that "An emotion cannot be at once revived in the same way that a feeling of light or sound can. It is impossible to bring instantly into consciousness the passion of anger, or that of joy, in however faint a form. Representation of either can be achieved only by imagining,

[12] Italics mine. What is the difference between "experiencing the same emotion over again" and "remembering an emotion"?

[13] Italics mine. Is it ever possible to "remember an object"?

and dwelling upon, some circumstances calculated to produce it." Bain (**8**, 91) remarked that "Feelings as such—pleasures, pains, and neutral excitement—are always incorporated with intellectual states, and by that means, are differentiated, held, sustained, and revived." James (**55**, 474) was fairly positive in his opinion: "The revivability in memory of the emotions, like that of all the feelings of the lower senses, is very small. We can remember that we underwent grief or rapture, but not just how the grief or rapture felt." Höffding (**51**, 241-2) considered the question quite carefully: "It is easier to recall ideas than the feelings which accompanied them. We can recall images and situations from the past, but only most imperfectly the moods which animated us. . . . Feelings are remembered by means of the ideas with which they were originally linked, and in conjunction with which they composed a certain conscious state. Only when we are absolutely absorbed, buried, in memories, can feeling be awakened. . . . The feelings which are linked with the senses of sight and hearing, and with free ideation and activity of thought, are more easily reproduced than those which we owe to the lower senses and especially than those which arise from the exercise of vegetative functions."

Ribot has been the principal exponent of affective memory, and in 1894 he reported the results of a study (**90**) in which he had questioned more than 60 adults of both sexes and of various stages of culture. He found that in the majority of cases only the conditions, circumstances, and accessories of the feeling or emotion could be recalled; but a minority of his *S*'s had a true affective memory and could recall not only the circumstances of the feeling but also the feeling itself. Ribot concluded that it was a serious mistake to assert that only the conditions of an emotion could be revived. Titchener answered with a broadside of criticisms (**112**), and reproached Ribot for not citing a single case of an emotional memory from which all sensory and ideational elements were absent, concluding that "It is impossible to attend to pleasantness-unpleasantness as such. It is therefore impossible to voluntarily recall a past affective state as such. . . . Spontaneous revival of a past affective state as such is also impossible." Ribot made his reply in a footnote in his book (**91**, 171). "A pleasure, a pain, an emotion, are always associated with a sensation, a representation, or an act; revival necessarily

bringing back the intellectual state which forms part of the complexus and supports it. But the real question is elsewhere: Is revival, in certain persons at least, a dry record, or a *felt* state? In this last case—and it does occur—there is the recollection of the emotional state as such." Ribot then once more summed up his earlier study, as follows: "The emotional memory is *nil* in the majority of people. In others there is a half intellectual, half emotional memory, *i.e.*, the emotional elements are only revived partially and with difficulty, by the help of the intellectual states associated with them. Others, and these the least numerous, have a true—*i.e.*, complete—emotional memory; the intellectual element being only a means of revival which is rapidly effaced." (**91**, 171).[14]

Ribot gave another statement of his views in 1907 (**92**),[15] and did not mention Titchener; and Titchener discussed affective memory quite briefly in his later treatments of feeling (**113**, 101-4, **114**, 493-5). Titchener could not attend to the "elementary" affective processes, but other observers could; and the discussion of affective memory was continued by less dualistic writers outside the Wundtian tradition, most of the articles appearing in the *Revue philosophique*. This discussion brought out the fact that some of the conscious activities involved in previously learned feelings and emotions can be reproduced.

It is now well known that learned affective activities are often clearly recognized as having existed or as having been experienced before. The reproduction of many activities is accompanied by a definite feeling of familiarity, and the traditional use of the word "feeling" in this connection is not accidental. With some recurrent affective experiences there is a definite feeling of familiarity, and with other affective experiences there is an element of unfamiliarity and strangeness. One frequently hears the remarks, "I have the same depressed feeling again," "This is the same fear I had several weeks ago," and "I have never felt this way before." Recognition memory occurs in connection with the stronger emotions of love, fear, and anger; and the recognition of affective processes is also manifested in connection with sensations,

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[14] For other treatments of affective memory before 1900, see Lehrmann, 63, 261-5, and Fouillée, 38, 199-205.

[15] Or 94, 39-82. See also 93.

feelings, moods, and sentiments, although not to the same degree for all of these mental activities.[16]

The revival of former affective experiences plays a relatively important role in the mental life of some people, but the individual differences in this ability are large. The involuntary recall of affective experiences is more efficient on the whole than voluntary recall. Visual and auditory images are superior to images of feelings and emotions, the affective images comparing favorably with olfactory, gustatory, kinaesthetic, and organic images. Inasmuch as all images are *learned* experiences, it necessarily follows as a matter of course that if affective images exist at all, that they can be recalled.[17]

If the definition of feelings and emotions that we have proposed be accepted, the question of whether affection is the basis of learning does not exist, since *most of the affectivities, both conscious and unconscious, are themselves learned.* Although the concept of feelings and emotions that we have described above includes the conscious activities, it is not desirable to try to think of feelings and emotions in terms of conscious experiences alone. The conscious activities are involved in the total pattern activity, but they are only a part of the total pattern activity. James' dualistic and intellectualistic theory of emotions assumed that affective processes are discontinuous accompaniments of cognitive experiences. But there is now sufficient justification for believing that among the activities involved in the feelings and emotions, the physical commonly influence the physiological, the sensory commonly influence the visceral, the neurological commonly influence the chemical, the conscious commonly influence the verbal, etc.; the whole group of activities presenting such a complicated picture of the causal interrelation of organic and personal factors that contributions to the subject of feelings and emotions should be heartily welcomed from any science that is involved, and research in any closely related field that will add to the total knowledge of the affectivities should be seriously encouraged.

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[16] On the subject of recognition memory, see especially Witasek, 124, Urban, 116, Piéron, 82, Dauriac, 29, 257-8, Urban, 117, 111-33, Baldwin, 9, Claparède, 23, and Sollier, 104.

[17] Other references on affective memory which have not been referred to above are: Pillon, 83, Mauxion, 67, Paulhan, 75, 76, Dugas, 32, Pillon, 84, 85, Angell, 6, 301-15, Dugas, 33, Peillaube, 78, 101-17, Abramowski, 1, 2, 3, Weber, 123, Dugas, 34, Guillaume, 48, and Dugas, 35.

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